

# UTILITY PATENT APPLICATION TRANSMITTAL (Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.  
5220.00

Total Pages in this Submission  
118

## TO THE ASSISTANT COMMISSIONER FOR PATENTS

Box Patent Application  
Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

**METHOD AND APPARATUS FOR LOCALLY TARGETING VIRTUAL OBJECTS  
WITHIN A TERMINAL**

and invented by:

ASMUSSEN, Michael L.

If a **CONTINUATION APPLICATION**, check appropriate box and supply the requisite information:

☐ Continuation ☐ Divisional ☒ Continuation-in-part (CIP) of prior application No.: 09/597,893

Which is a:

☐ Continuation ☐ Divisional ☒ Continuation-in-part (CIP) of prior application No.: 09/054,419

Which is a:

☐ Continuation ☐ Divisional ☒ Continuation-in-part (CIP) of prior application No.: 08/735,549

Which is a:

☒ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: 08/160,280

Which is a:

☐ Continuation ☐ Divisional ☒ Continuation-in-part (CIP) of prior application No.: 07/991,074

1. ☒ Filing fee as calculated and transmitted as described below

2. ☒ Specification having 82 pages and including the following:

- a. ☒ Descriptive Title of the Invention
- b. ☒ Cross References to Related Applications (if applicable)
- c. ☐ Statement Regarding Federally-sponsored Research/Development (if applicable)
- d. ☐ Reference to Microfiche Appendix (if applicable)
- e. ☒ Background of the Invention
- f. ☒ Brief Summary of the Invention
- g. ☒ Brief Description of the Drawings (if drawings filed)
- h. ☒ Detailed Description
- i. ☒ Claim(s) as Classified Below
- j. ☒ Abstract of the Disclosure

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## Application Elements (Continued)

3. ☒ Drawing(s) (when necessary as prescribed by 35 USC 113)
- a. ☒ Formal                      Number of Sheets 29
- b. ☐ Informal                      Number of Sheets \_\_\_\_\_
4. ☒ Oath or Declaration
- a. ☐ Newly executed (original or copy)                      ☒ Unexecuted
- b. ☐ Copy from a prior application (37 CFR 1.63(d)) (for continuation/divisional application only)
- c. ☐ With Power of Attorney                      ☐ Without Power of Attorney
- d. ☐ DELETION OF INVENTOR(S)  
Signed statement attached deleting inventor(s) named in the prior application,  
see 37 C.F.R. 1.63(d)(2) and 1.33(b).
5. ☐ Incorporation By Reference (usable if Box 4b is checked)  
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. ☐ Computer Program in Microfiche (Appendix)
7. ☐ Nucleotide and/or Amino Acid Sequence Submission (if applicable, all must be included)
- a. ☐ Paper Copy
- b. ☐ Computer Readable Copy (identical to computer copy)
- c. ☐ Statement Verifying Identical Paper and Computer Readable Copy

## Accompanying Application Parts

8. ☐ Assignment Papers (cover sheet & document(s))
9. ☐ 37 CFR 3.73(B) Statement (when there is an assignee)
10. ☐ English Translation Document (if applicable)
11. ☐ Information Disclosure Statement/PTO-1449                      ☐ Copies of IDS Citations
12. ☐ Preliminary Amendment
13. ☐ Acknowledgment postcard
14. ☐ Certificate of Mailing
- ☐ First Class                      ☐ Express Mail (Specify Label No.): \_\_\_\_\_

**UTILITY PATENT APPLICATION TRANSMITTAL**  
**(Large Entity)**

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**Accompanying Application Parts (Continued)**

15. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed)

16. ☐ Additional Enclosures (please identify below):

**Fee Calculation and Transmittal**

**CLAIMS AS FILED**

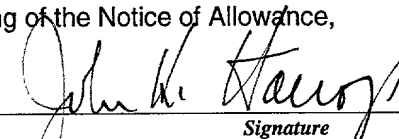
For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	78	- 20 =	58	x \$18.00	\$1,044.00
Indep. Claims	13	- 3 =	10	x \$78.00	\$780.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
BASIC FEE					\$690.00
OTHER FEE (specify purpose)					\$0.00
TOTAL FILING FEE					\$2,514.00

- ☒ A check in the amount of \$2,514.00 to cover the filing fee is enclosed.
- ☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. 04-1425 as described below. A duplicate copy of this sheet is enclosed.
- ☐ Charge the amount of as filing fee.
- ☒ Credit any overpayment.
- ☒ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
- ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).

Dated:

July 28, 2000

cc:

  
Signature  
John K. Harrop, Reg. No. 41,817  
DORSEY & WHITNEY LLP  
1001 Pennsylvania Avenue, N.W.  
Suite 300 South  
Washington, D.C. 20004  
(202) 824-8800

1           **METHOD AND APPARATUS FOR LOCALLY TARGETING VIRTUAL**  
2                           **OBJECTS WITHIN A TERMINAL**

3           This application is a continuation-in-part of U.S. Application Serial Number  
4 09/597,893, filed June 19, 2000, entitled METHOD AND APPARATUS FOR  
5 TARGETING VIRTUAL OBJECTS, which is a continuation-in-part of U.S. Application  
6 Serial Number 09/054,419, filed April 3, 1998, entitled TARGETED ADVERTISEMENT  
7 USING TELEVISION DELIVERY SYSTEMS, which is a continuation-in-part of U.S.  
8 Application Serial Number 08/735,549, filed October 23, 1996, entitled METHOD AND  
9 APPARATUS FOR TARGETED ADVERTISING, which is a continuation of U.S.  
10 Application Serial Number 08/160,280, filed December 2, 1993, entitled NETWORK  
11 CONTROLLER FOR CABLE TELEVISION DELIVERY SYSTEM, now U.S. Patent  
12 Number 5,600,364, which was a continuation-in-part of U.S. Application Serial Number  
13 07/991,074, filed December 9, 1992, entitled REMOTE CONTROL FOR MENU DRIVEN  
14 SUBSCRIBER ACCESS TO TELEVISION PROGRAMMING.

15           **Technical Field**

16           The technical field relates to a method and apparatus for providing virtual objects that  
17 are targeted to subscribers based on processing performed locally by a subscriber's terminal.  
18 The method and apparatus specifically relate to monitoring, controlling, and managing a content  
19 delivery network including an operations center, a local insertion center, or a subscriber's local  
20 terminal.

21           **Background**

22           Television as an advertising medium has undergone significant advances since its  
23 inception in 1939. Modern advances in digital technology now allow viewers to be very  
24 selective in choosing programs to watch. Other advances in digital technology have led to such  
25 programming enhancements as a "tail" on a hockey puck, or an overlaid first down marker on  
26 a football field. The same technological advances allow improvements in the way  
27 advertisements are currently presented. Many sporting events are now presented with virtual  
28 object advertisements included in the video. For example, the broadcast of a major league

1 baseball game may include one or more virtual object spots in which an advertisement is  
2 displayed. The advertisements are then seen by television viewers, but not by fans who attend  
3 the game. However, the advertisements are fixed, and are not varied according to individual  
4 viewers.

## 5 **Summary**

6 A system and a method delivers targeted virtual objects to reception sites. A virtual  
7 object is a realistic, synthetic replica of an actual object. The virtual object is viewable within  
8 video programming and may be combined with original video and audio to supplement or  
9 replace portions of the original video and audio content. Virtual objects may be overlaid on  
10 video, partially or entirely obscuring the underlying video. An overlaid object may be static in  
11 nature, such as a graphical icon or the like, or alternatively may be dynamic, such as a video  
12 clip, animation, or scrolling alphanumeric characters, for example. Overlaid objects may be  
13 limited spatially to a fixed portion of the video screen, limited temporally to a given time for  
14 display, limited by a combination of both location and time, or tied to a spatially changing  
15 portion of the screen that is moving with time. Alternatively, virtual objects may be added to  
16 and embedded within the actual video. Multiple virtual objects may be embedded in the video  
17 in a multi-layer fashion. The virtual object is indistinguishable from the other video content  
18 sharing the field of view. Virtual objects may be interactive in nature. That is, a viewer may  
19 select an object and the selection will initiate a process whereby a reception site sends a  
20 command to a location designated by the interactive virtual object to initiate some action.

21 An operations center may process the video signal to allow for the insertion of virtual  
22 objects into the video. An object delivery center serves as a standalone or supplemental  
23 system to the operations center to deliver virtual objects independently of the video with which  
24 the virtual objects are to be associated. A delivery network includes any of a number of  
25 different delivery systems to support the delivery of video and virtual objects from the  
26 operations center and the object delivery center to a local insertion center, or directly to a  
27 reception site. The delivery network is also used to deliver video and virtual objects from the

1 local insertion center to the reception site. The reception site receives the video and virtual  
2 objects and associates the appropriate virtual objects with the video based on targeting  
3 algorithms.

4 The reception site collects virtual object viewing information. The reception site may  
5 use the virtual object viewing information and other information stored at the reception site to  
6 locally target the virtual objects at the reception site. Performing all targeting locally to the  
7 reception site maintains the subscriber's privacy. The reception site also provides interactive  
8 requests, which are driven by the selection of interactive virtual objects, to an interactive object  
9 servicing center using the delivery network. Interactive responses are returned by the  
10 interactive object servicing center to the requesting reception site.

11 The process of managing the content and the virtual objects to be included in the  
12 content begins with a number of configuration and set-up steps. Generic reception site and  
13 viewing population information can be collected at the operations center. This information is  
14 used to characterize the population of reception sites viewing the content in which virtual  
15 objects are to be placed. Information may be collected from various sources, including viewer  
16 surveys and marketing databases correlated by zip code+4, Nielsen or Arbitron program rating  
17 services, for example.

18 Next, reception site groups are determined. For a number of target categories, groups  
19 are defined. Examples of target categories include demographic targeting (age/sex/income) and  
20 location, such as Area of Dominant Influence (ADI), for example. Each target category is then  
21 segmented into appropriate groups. For example, the ADI may include Los Angeles, CA and  
22 Washington D.C. New target categories can be added and the groups redefined after their  
23 initial establishment.

24 Group assignment rules are then created by the operations center based on information  
25 being collected and tracked locally by each reception site. These group assignment rules are  
26 then periodically distributed to all reception sites.

For each target category, each reception site assigns itself to a group based on the information collected by the reception site and the group assignment rules provided by the operations center and stores the group assignments therein.

The group assignment information that is stored at the reception site is able to survive power cycling of the reception site, and other normal service interruptions. Finally, as groups are modified or group assignment rules change, reception sites are notified of the changes using updated group assignment rules being distributed by an operations center. Additionally, the group assignment rules may be periodically resent to the reception sites to ensure that newly added reception sites and to reception sites that have accidentally lost their information are up-to-date.

A virtual object location definer system determines where in the content the virtual objects are to be placed and the rules associated with placement of the virtual objects. Content may be video programming, commercials and advertisements, or electronic program guide (EPG) information, for example. A virtual object selector system determines which available virtual objects are suitable for placement in a virtual object location. A targeted virtual object management system determines which reception site groups should receive and display which virtual object for a given virtual object location. The virtual objects and targeting information are then distributed to reception sites.

After a reception site receives and stores the virtual objects and targeting information, the reception site will place the most appropriate virtual object into virtual object locations based on the targeting information, and will display the combined content with the overlaid or embedded virtual object.

The reception site stores information indicating that a virtual objects was inserted. The accumulated history information may be collected by the reception site and stored for review purposes at a later time or for use with the group assignment rules. As mechanisms become available to identify specific viewers in a household, the reception site allows for individual identification information to also be provided with collected and stored data.

1           A centralized operations center can determine virtual object locations available for  
2 virtual object placement. Alternatively, a local insertion center can determine the virtual object  
3 locations. The operations center can determine the specific virtual objects to be placed in a  
4 virtual object location. Alternatively, the local insertion center may determine the specific virtual  
5 objects to be placed in a virtual object location. The reception site itself can determine which  
6 virtual object is to be placed in a virtual object location based on its own internal routines.

7           Content, virtual objects, and associated targeting / virtual object placement control and  
8 group assignment rules can be relayed to reception sites. The reception site may reside within  
9 a digital cable set top box that has access to a delivery network. Alternately, the reception site  
10 may be components of digital television satellite receivers. The reception site may be  
11 incorporated into the circuitry of a television, thereby eliminating the need for a separate control  
12 device attached to the television. Alternatively, the reception site may be incorporated into a  
13 personal computer, personal data device, smart phone with a display, or electronic book  
14 device.

### 15       **Description Of The Drawings**

16           The detailed description will refer to the following drawings in which like numerals refer  
17 to like items, and in which:

18           Figure 1 is an overview of the virtual object targeting delivery system;

19           Figure 2 provides a pictorial representation of virtual objects and virtual object  
20 locations;

21           Figure 3 is an example of an overlaid virtual object;

22           Figure 4 is an example of an embedded virtual object;

23           Figure 5 depicts an operations center;

24           Figure 6 depicts a virtual object definer;

25           Figure 7 is a pictorial representation of a virtual object location matte;

26           Figure 8 depicts a virtual object selector;

27           Figure 9 depicts a targeted virtual object management system;



1           Figure 10 shows configuration and set-up steps associated with targeting virtual  
2 objects;

3           Figure 11 shows a subscriber information database system;

4           Figure 12 shows a configuration set-up system;

5           Figure 13 shows a virtual object targeting system;

6           Figure 14 presents an embodiment of the overall process for assigning targeted virtual  
7 objects;

8           Figure 15 presents an embodiment of a process used by the virtual object placement  
9 engine to assign virtual objects to virtual object locations;

10          Figure 16 presents an alternate embodiment used by the virtual object placement engine  
11 to assign virtual objects to virtual object locations;

12          Figure 17 presents yet another embodiment used by the virtual object placement engine  
13 to assign virtual objects to virtual object locations;

14          Figure 18 depicts an object delivery center;

15          Figure 19 presents embodiments associated with the delivery of virtual objects over a  
16 coaxial or fiber cable system to a reception site;

17          Figure 20 presents embodiments associated with the delivery of virtual objects over a  
18 wireless broadcast system to a reception site;

19          Figure 21 presents embodiments associated with the delivery of virtual objects over a  
20 satellite broadcast system to a reception site;

21          Figure 22 presents embodiments associated with the delivery of virtual objects over a  
22 wired data network to a reception site;

23          Figure 23 presents embodiments associated with the delivery of virtual objects using  
24 the public switched telephony network (PSTN) to a reception site;

25          Figure 24 presents embodiments associated with the delivery of virtual objects using  
26 wireless personal communications system (PCS) to a reception site;

1           Figure 25 depicts several embodiments associated with the delivery of virtual objects  
2 using a national or local television broadcaster's signal;

3           Figure 26 depicts a local insertion center;

4           Figure 27 depicts an example of a reception site;

5           Figure 28 depicts an interactive object servicing center; and

6           Figure 29 presents processing performed by an interactive object servicing  
7 center.

### 8           **Detailed Description**

9           An overview of the virtual object delivery system is depicted in Figure 1. An  
10 operations center 10 performs the processing of a video content signal to allow for the insertion  
11 of virtual objects into the content 36. An object delivery center 15 serves as a standalone or  
12 supplemental system to the operations center 10 to deliver virtual objects independent of the  
13 content with which the virtual objects are to be associated. A delivery network 11 includes any  
14 of a number of different delivery systems to support the delivery of the content 36 and virtual  
15 objects from the operations center 10 and the object delivery center 15 to a local insertion  
16 center 20 or directly to a reception site 30. A delivery network 12 is used to deliver content  
17 and virtual objects from a local insertion center 20 to the reception site 30. The reception site  
18 30 may be any device or terminal capable of receiving video, including a set top terminal, a  
19 television, a personal computer, a wireless telephone, a wired telephone, a PDA device, an  
20 electronic book, at digital satellite television receiver or any similar device or terminal.

21           The reception site 30 receives the content 36 and virtual objects and associates the  
22 appropriate virtual objects with the content 36 based on internal targeting algorithms and group  
23 assignment rules. The reception site 30 may collect virtual object viewing information to be  
24 used in targeting virtual objects and in assigning the reception site to the appropriate group for  
25 each target category. The reception site 30 provides interactive requests, which are driven by  
26 the selection of interactive virtual objects, to an interactive object servicing center 60 using a

1 delivery network 14. Interactive responses are returned by the interactive object servicing  
2 center 60 to the requesting reception site 30.

3 Virtual objects may be realistic, synthetic replicas of actual objects. Virtual objects  
4 may also be caricatures of actual individuals, photographs or other life-like renderings of actual  
5 individuals, cartoon figures, text objects, graphical renderings, or icons, for example. The virtual  
6 objects may be animated or fixed. The virtual objects are combined with video and audio to  
7 supplement or replace portions of video and audio in original content 36. As shown in Figure  
8 2, the reception site 30 may contain or be connected to a display 35 on which the content 36  
9 may be displayed. An opportunity, advertisement spot, or location, in the content 36 that is  
10 available for the placement of the virtual object will be denoted as a virtual object location 37  
11 henceforward. Within the virtual object location 37, one or more individual virtual objects may  
12 be assigned, each denoted as a virtual object 38 henceforward. Multiple virtual object  
13 locations, shown as virtual object locations 37 and 39 may be present in the content 36.  
14 Multiple virtual objects, shown as virtual objects 38 and 40 may be present within the virtual  
15 object locations.

16 As shown in Figure 3, virtual objects may be overlaid on video, partially or entirely  
17 obscuring the underlying video. An overlaid virtual object may be static in nature, like a  
18 graphical icon, as shown by virtual object 42. Alternatively the overlaid virtual object may be  
19 dynamic, like a video clip, animation, or scrolling alphanumeric characters as shown by virtual  
20 object 44. Overlaid virtual objects may be limited spatially to a fixed portion of the video,  
21 limited temporally to a given time for display, or limited by a combination of both location and  
22 time. Overlaid virtual objects may also be tied to a spatially changing portion of the video that  
23 is moving with time.

24 Alternatively, as shown in Figure 4, virtual objects may be added to and embedded  
25 within video. In this alternative, a synthetic virtual object could be indistinguishable from the  
26 other video content 36 sharing the field of view as shown by virtual object 46 and virtual object  
27 48. For instance, today's technology allows for the virtual placement of a billboard at televised

1 sports events and the placement of a virtual first down marker in televised football  
2 games.

3 In an embodiment, virtual reality and animation technologies are combined with  
4 advanced digital video techniques to provide realistic interaction of virtual objects within video.  
5 Combining these technologies, a soda can may be synthetically placed in the video, and may  
6 then be made to change over time. This placement and subsequent modification can occur at  
7 the video's source, at an intermediate point within the distribution and delivery path, or at the  
8 reception site 30. Combining the placement of virtual objects with the ability to target specific  
9 virtual objects to specific viewers or groups of viewers allows one household to see a scene  
10 with the soda can for cola, while the next door neighbor sees a root beer soda can, for  
11 example.

12 Virtual objects may be interactive in nature, where a viewer can select a virtual object  
13 35 and this selection will initiate a process whereby the reception site 30 sends a command to  
14 the location designated by the interactive virtual object 38 to initiate some action. Actions may  
15 include linking to a Web site to display content related to the interactive virtual object 38,  
16 initiating a purchase transaction, or initiating a request for more information about the selected  
17 virtual object 38.

18 The operations center 10 shown in Figure 1 may include a number of systems that act  
19 together in processing the content 36 for the inclusion of virtual objects, for the selection of  
20 appropriate virtual objects to be placed in the content 36, for the targeting of virtual objects to  
21 reception site groups, and for the packaging and delivery of the content 36 and virtual objects  
22 to reception sites.

23 Placement of virtual objects can be explicitly selected by the operations center 10,  
24 resulting in the specific selection and placement of virtual objects into content 36. Alternatively,  
25 the placement may be generically defined by the operations center 10. In this alternative, the  
26 reception site 30 performs all the processing associated with selecting the appropriate virtual

1 object 38 to be placed in the content 36 based on basic guidelines provided by the operations  
2 center 10 and algorithms operating at the reception site 30.

3 As shown in Figure 5, the operations center 10 includes a virtual object location definer  
4 100, a virtual object selector 200, and a targeted virtual object management system (TVOMS)  
5 300.

6 Figure 6 presents the virtual object location definer 100. A video capture processor  
7 110 processes video and audio content 36 on a frame by frame basis, converting the original  
8 content 36 into a corresponding digitized representation. The processed content 36' is then  
9 stored in content buffer 120 for future access. A pre-viewer subsystem 130 allows for the  
10 viewing of a video frame of the processed content 36'. Frame N 141, for example, (shown in  
11 Figure 7) associated with the processed content 36', may be retrieved from the content buffer  
12 120, viewed, and passed to a location selector processor 140. The location selector processor  
13 140 allows for the selection of where in the frame N 141 the virtual object 38 may be placed.  
14 When the frame N 141 is retrieved by the location selector processor 140, either a static area  
15 may be selected, or alternatively, a dynamic area, which is tied to an area within the frame of  
16 the processed content 36', may be selected. An overlay matte 16 (see Figure 7) may be used  
17 in the virtual object insertion process to identify where and how a virtual object location 37 is  
18 to be placed in the processed content 36'.

19 Techniques for pattern recognition used by the location selector processor 140 to  
20 facilitate the creation of the matte 16 and the identification of the pixels within the frame that the  
21 matte 16 is to be associated with for that frame are described in detail in US Patent 5,808,695,  
22 to Rosser, Roy J.; Das, Subhodev; and Tan, Yi; entitled Method of Tracking Scene Motion  
23 for Live Video Insertion; US Patent 5,903,317, to Sharir, Avi; and Tamir, Michael; entitled  
24 Apparatus and method for Detecting, Identifying, and Incorporating Advertisements in a Video;  
25 US Patent 5,524,065, to Yagasaki, Toshiaki; entitled Method and Apparatus for Pattern  
26 Recognition; US Patent 5,627,915, to Rosser, Roy J.; Das, Subhodev; and Tan, Yi; von  
27 Kaenel, Peter; entitled Pattern Recognition System Employing Unlike Templates to Detect

1 Objects Having Distinctive Features in a Video Field; and US Patent 4,817,171, to Stentiford,  
2 Frederick; entitled Pattern Recognition System, the disclosures of which are hereby  
3 incorporated by reference.

4 When the area is selected by the location selector processor 140 and the overlay matte  
5 16 for the initial video frame N 141 is created, a video object marker processor 160 creates  
6 the transparent overlay matte 16 that is associated with the selected area for subsequent  
7 frames, for example frame N+1 142 and frame N+2 143 of the processed content 36', for the  
8 duration of frames designated, as shown in Figure 7. This selected area defines the virtual  
9 object location 37. Pattern recognition technology may then be applied to each subsequent  
10 frame of the processed content 36' in the video object marker processor 160, creating a  
11 sequence of mattes to be applied to each frame of the processed content 36', moving and  
12 transforming as needed to match the temporal movement and transformations of the virtual  
13 object location 37 within the processed content 36' to which the virtual object 38 is to be tied.  
14 The pattern recognition technology handles transitions, cutaways, and cutbacks within the  
15 processed content 36', and any visual blocking or occlusions that may occur as other objects  
16 within the processed content 36' appear in front of the dynamic area selected for virtual object  
17 location 37.

18 Simultaneously with the selection of the virtual object location 37 and the creation of  
19 the mattes, a virtual object rules processor 170 allows for the entry of rules that govern the  
20 types of virtual objects and other relevant placement guidelines associated with the virtual  
21 object location 37. These rules allow for the selection of characteristics such as the duration  
22 of the virtual object location 37, and viewing overlay characteristics such as transparency of  
23 the overlay virtual object. The operations center 10 processes the stored, non-realtime  
24 processed content 36' and the real-time (live) processed content 36'. For real-time processed  
25 content 36', the content buffer 120 serves as a short buffer, and predefined rules are  
26 pre-loaded into the virtual object rules processor 170. Additionally, the video object marker  
27 processor 160 is pre-loaded with the directions as to which locations within the processed

content 36' are to be treated as virtual object locations. The video object marker processor 160 then automatically searches the real-time processed content 36' using pattern recognition technologies presented above, or other technologies, and automatically creates the mattes required for each virtual object location. Once the video object marker processor 160 creates the mattes and the associated controls, the mattes are associated with the actual processed content 36' in the content buffer 120. The processed content 36', along with the mattes are then optionally processed using the optional video processor 150, which performs any necessary content encoding (e.g., MPEG4, or digitalization), and makes the content 36' available to a rules application processor 180. The rules application processor 180 creates metadata packets that carry the virtual object placement rules information and mattes and associates these packets with the processed content 36' for each virtual object location 37 selected in the virtual object location definer 100.

Figure 8 is a block diagram of the virtual object selector 200. Processed content 36', along with the metadata packets carrying the virtual object placement rules information associated with each virtual object location 37 and the mattes 16 are provided by the virtual object location definer 100 to the virtual object selector 200. An object selector processor 210 extracts the placement rules and stores the processed content 36' in a content buffer 240. Using the placement rules, along with any operator entered object placement guidance, the object selector processor 210 queries an object matcher processor 230 to initiate the selection of virtual objects that match the requisite rules. The object matcher processor 230 can be commanded by the object selector processor 210 to match a virtual object 38 in at least three manners: 1) automatically, 2) with manual placement, and 3) with pre-selected virtual objects. For automatic matching, the object matcher processor 230 searches an available virtual objects database 220 to find virtual objects that meet the placement rules provided by the object selector processor 210. The matching virtual objects are then marked in the available virtual objects database 220 as suitable for that virtual object location 37. For manual matching, the operator of the object matcher processor 230 manually selects the desired virtual objects to

1 be associated with a virtual object location 37, and marks the selected virtual objects as  
2 suitable for the virtual object location 37 in the available virtual objects database 220. For  
3 pre-selected objects, the placement rules will indicate the pre-defined virtual objects to be  
4 associated with the processed content 36'. The object matcher processor 230 marks the  
5 pre-determined virtual objects in the available virtual objects database 220 as being associated  
6 the particular processed content 36' and virtual object location 37.

7 Virtual objects may be processed and stored in the available virtual objects database  
8 220 before they are used. Processing of the virtual objects includes digitizing the virtual object  
9 38 and associating the virtual object with those virtual object 38 placement guidelines and rules  
10 that must be followed to place the virtual object 38 within virtual object locations. The rules  
11 and guidelines may include product categories with which the virtual object 38 should be  
12 associated, or in contrast, cannot be associated with, the type of virtual object 38, the duration  
13 that the virtual object 38 is valid to be used, and the number of times the virtual object 38 may  
14 be used.

15 In a non-realtime environment, an optional post viewer processor 260, which is  
16 preceded by a virtual object insertion processor 250, is used to view the content 36 and insert  
17 each virtual object 38 that was matched to the content 36 by the object matcher processor 230  
18 in the corresponding virtual object location 37. Techniques for insertion of overlaid virtual  
19 objects are described in detail in U.S. Patents 4,319,266 to Bannister, Richard S.; entitled  
20 Chroma Keying System; 4,999,709 to Yamazaki, Hiroshi; and Okazaki, Sakae; entitled  
21 Apparatus for Inserting Title Pictures; 5,249,039, to Chaplin, Daniel J.; entitled Chroma Key  
22 Method and Apparatus; and 5,233,423 to Jernigan, Forest E.; and Bingham, Joseph; entitled  
23 Embedded Commercials within a Television Receiver using an Integrated Electronic Billboard,  
24 the disclosures of which are hereby incorporated by reference.

25 Techniques for the insertion of embedded virtual objects are described in detail in U.S.  
26 Patents 5,953,076, to Astle, Brian; and Das, Subhudev; titled System and Method of Real  
27 Time Insertions into Video Using Adaptive Occlusion with a Synthetic Reference Image;



1 5,892,554, to DiCicco, Darrell; and Fant, Karl; entitled System and Method for Inserting  
2 Static and Dynamic Images into a Live Video Broadcast; 5,515,485, to Luquet, Andre; and  
3 Rebuffet, Michel; entitled Method and Device for Modifying a Zone in Successive Images;  
4 5,903,317, to Sharir, Avi; and Tamir, Michael; entitled Apparatus and Method for Detecting,  
5 Identifying and Incorporation Advertisements in a Video; and the MPEG4 standard, the  
6 disclosure of which are hereby incorporated by reference.

7 In a realtime environment, the optional post viewer processor 260 is bypassed, and the  
8 default virtual object 38 is placed in the virtual object location 37 by a default virtual object  
9 insertion processor 270, which includes (not shown) a virtual object insertion processor 250.

10 The targeted virtual object management system (TVOMS) 300 shown in Figure 9  
11 allows for virtual objects, including virtual object-based advertisements, to be directed to  
12 groups of subscribers based on, for example, the use of subscriber data, programs watched  
13 data, past virtual objects viewing data, and/or mood indicators entered by the subscriber.  
14 Alternatively, input from subscribers collected through form-based on screen questionnaires  
15 may be used to further define a subscriber's potential likes, wants, and needs and store this  
16 information at the reception site 30. Advertisers wanting to optimize their advertising  
17 expenditures may direct virtual objects to the appropriate viewing audiences to ensure that the  
18 desired audience views specific virtual objects. Advertisers can display specific virtual objects  
19 in content 36 that is being viewed by those subscribers most likely to be influenced to buy the  
20 advertised product, or otherwise respond in a desired fashion to the virtual objects.

21 Virtual objects may also be targeted to reception sites on various levels. At a highest  
22 level, virtual objects can be delivered to all reception sites viewing content 36, with no targeting  
23 of the virtual objects to the subscriber, but with the virtual objects displayed in the content 36  
24 that are determined to be most relevant to the content 36. That is, the virtual objects are  
25 placed in the virtual object location 37 without the use of any group targeting. Alternatively,  
26 some level of targeting may occur based on, for example, ADI, zip code +4, geographical data  
27 and other similar criteria known by the reception site 30. In this alternative embodiment, the

1 virtual objects are sent to a reception site, and a local insertion routine at the reception site 30  
2 controls placement of the virtual objects into the virtual object locations 37 in the content 36.  
3 The virtual objects may be stored at the reception site 30 and may be periodically refreshed.  
4 To account for reception sites that do not have virtual objects available for insertion, the content  
5 36 may be provided with a default virtual object 38 embedded in the content 36. Upon receipt  
6 of the content at a reception site 30, the reception site 30, using the local insertion routine,  
7 determines if the default virtual object 38 should be replaced with another virtual object residing  
8 in the reception site's memory or being delivered concurrently with the content 36.

9 Alternatively, virtual objects may be targeted to groups of reception sites, with the  
10 groups of reception sites categorized based on some other common subscriber characteristics  
11 such as programs watched data, for example. Finally, virtual objects may also be targeted to  
12 specific subscribers that share the use of a reception site 30 based on their unique subscriber  
13 characteristics. Individual subscribers sharing the use of a reception site 30 may identify  
14 themselves when beginning to view content 36 at the reception site 30, resulting in the unique  
15 assignment of groups for the reception site 30 during that individual subscriber's use of the  
16 reception site 30.

17 The TVOMS 300 provides the management of information required to support each  
18 of the following: (1) delivery of targeted virtual objects along with content 36 being broadcast;  
19 (2) delivery of targeted virtual objects to reception sites independent of any content 36 being  
20 broadcast; and (3) delivery of TVOMS-related information including group assignment rules  
21 and retrieval plans to reception sites. The TVOMS 300 may be executed in software routines  
22 operating on a general purpose computer or a processor. The TVOMS 300 may also be  
23 executed, at least partly, in hardware. Finally, the TVOMS 300 may include various databases  
24 containing information to support targeting of virtual objects.

25 Figure 9 shows the TVOMS 300 supporting the targeting of virtual objects to groups  
26 of subscribers. Broadcast information can be destined for the entire population of subscribers  
27 receiving the content 36, or groups of subscribers. Broadcast information can include actual

1 content 36, metadata packets with virtual object insertion control information, virtual objects  
2 for placement within the content 36, and group assignment rules required by the subscriber's  
3 reception site 30 to configure the reception site 30 and retrieval plans to guide the reception  
4 site 30 in placing the appropriate virtual object 38 within the content 36. Broadcasting of this  
5 information may be supported over a variety of broadcast-capable communication systems,  
6 such as the Internet, cable television systems, terrestrial broadcast systems, satellite broadcast  
7 systems, and wireless communications systems, and other systems described below.

8 A viewing population information database 1210 in the TVOMS 300 contains viewing  
9 population information collected from numerous sources including marketing database services,  
10 from Arbitron or Nielsen program rating services, or subscriber surveys, for example. The  
11 viewing population information may be used by a virtual object targeting system 1220 to  
12 determine the best virtual objects to be distributed for inclusion in the content 36. The virtual  
13 object targeting system 1220 determines the optimum subset of virtual objects to be associated  
14 with the content 36 based on the selected object metadata provided by the virtual object  
15 selector 200 (Figure 5) and viewing population information from the viewing population  
16 information database 1210. A content and virtual object packager 1260 is directed to retrieve  
17 the appropriate virtual objects from an available virtual objects database 1265. The content  
18 and virtual object packager 1260, then, along with the content 36 from a content buffer 1270,  
19 addresses the virtual objects with the appropriate group addressing information, and packages  
20 the virtual objects with the content 36. A delivery processor 1300 then delivers the combined  
21 package of virtual objects, content 36, and metadata to subscribers.

22 As an alternative to delivering virtual objects with associated content 36, virtual objects  
23 can be delivered independently to groups of subscribers as a result of modified group  
24 assignments or group assignment rules, or the need for refreshed virtual objects at reception  
25 sites. Initiation could be automatic based on a scheduled cycle or by TVOMS operator  
26 direction. Upon delivery initiation, the virtual object targeting system 1220 uses viewing  
27 information from the viewing population information database 1210, information about available

virtual objects from the available virtual objects database 1265, and information about previously delivered virtual objects from the viewing population information database 1210, to select the appropriate virtual objects to be packaged and delivered to a group of reception sites. Once the virtual object targeting system 1220 determines the appropriate virtual objects, the content and virtual object packager 1260 retrieves the appropriate virtual objects, packages the virtual objects, addresses the information to a group or groups of reception sites, and delivers the information to the appropriate groups of reception sites using a delivery processor 1300. Virtual objects may be broadcast to all reception sites, and a reception site 30 may store only the virtual objects that are associated with groups to which the reception site 30 belongs. Alternatively content 36, virtual objects, and other information destined to reception sites may be provided to the object delivery center 15 (Figure 1) for delivery to reception sites.

The databases addressed in Figure 9 may be configured to support a variety of information necessary for the TVOMS 300 to manage the targeting process. Below are tables that present typical data that may be tracked by these individual databases.

#### Viewing Population Information Database 1210

Criteria being captured by reception sites for targeting purposes

Target categories and groups for each category

Current group assignment rules

Past group assignment rules

Upcoming group assignment rules

Estimated number of reception sites per zip+4 area

Estimated number of reception site subscribers by:

Sex

Age

Education

Profession

Household income

ADI

Past subscriber survey data or actual data presenting, by subscriber group type:

TV program preferences

Demographic information

Past virtual object viewed data, time spent viewing

Past products ordered, along with time, date, and method of order

Past TV programs watched data, along with time and date

Past PPV programs ordered data, along with time and date

Nielsen and Arbitron program viewing statistics

Generic subscriber profile information.

for each category

Available Virtual Objects Database 1265

Virtual object identifier with actual digital version of virtual (CR) object

Display options (e.g., text, audio, graphics, video, link, HTML, XML, interactive)

Static vs. dynamic virtual object indicator,

If a linked virtual object, link table information

Pricing subsidy information

Run through completion status mode indication

Date of valid use

Virtual object placement controls, acceptable frequency

Category and group preferences (as virtual object ranking percentages)

Within the TVOMS 300, the virtual object targeting system 1220 is responsible for the intelligent and rapid selection of virtual objects for placement in content 36. Category and group targeting is managed in a manner similar to that described in co-pending U.S. Application Serial No. 09/597,893, entitled METHOD AND APPARATUS FOR TARGETING VIRTUAL OBJECTS, filed June 19, 2000, and in co-pending U.S. Application Serial No.

09/054,419 entitled TARGETED ADVERTISEMENT USING TELEVISION DELIVERY SYSTEM, filed April 3, 1998, and in co-pending U.S. Application Serial No. 09/328,672 entitled ELECTRONIC BOOK SELECTION AND DELIVERY SYSTEM WITH TARGETED ADVERTISING, filed on June 9, 1999, each of which are incorporated herein by reference.

Careful management of the virtual objects within the content 36, based on information known about the demographics and viewing habits of typical subscribers, for example, can greatly increase both the advertisers' likelihood of reaching an interested subscriber, and the likelihood a subscriber will be interested in a specific virtual object 38. Each virtual object location 37 within the content 36 is assigned a series of virtual objects by the TVOMS 300, and when multiple virtual objects are delivered for a given virtual object location 37 in the content 36, a retrieval plan is developed that directs which virtual objects should be displayed by a given group of subscribers or reception sites, or the entire subscriber population.

The process of managing the targeted virtual objects may include a number of configuration and set-up steps shown in Figure 10 that begins with the start step shown in block 7010 and ends with the end step shown in block 7017. First, a number of target categories are defined as shown in block 7013. Examples of target categories include demographic targeting (age/sex/income) and location, such as Area of Dominant Influence (ADI). Next, as shown in block 7014, each target category may be segmented into appropriate groups. For example, the ADI may include the groups Los Angeles, CA and Washington D.C. New target categories can be added and the groups included in the target category redefined after their initial establishment.

Next, as shown in block 7015, for each target category, group assignment rules are created that allow for reception sites to be assigned to a group for each target category based on the information collected at the reception site 30. The group assignment rules generation process is described in detail later. Group assignment rules are conveyed to all reception sites and are stored therein, as shown in block 7016. As groups are modified or group assignment

1 rules change, the reception sites are provided with the changes. Additionally, the group  
2 assignment rules are periodically broadcast to ensure that newly added reception sites and  
3 those reception sites that have accidentally lost their information are up-to-date. As an  
4 alternative to, or in conjunction with conveying the group assignment rules, an initial set of group  
5 assignment rules may be provided with the reception site 30. For example, if the reception site  
6 30 is a television set top terminal, the terminal may have embedded as a software routine, an  
7 initial set of group assignment rules. The group assignment rules may then be updated as  
8 needed.

9 Returning to Figure 9, the virtual object targeting system 1220 determines the optimum  
10 types of virtual objects to be placed in the content 36 from the selected virtual objects provided  
11 by the virtual object selector 200 (Figure 5). The virtual object targeting system 1220 takes  
12 into account groups of subscribers who will likely view the content 36, the desirability of  
13 providing available virtual objects to those groups of subscribers, target categories, the number  
14 of virtual objects locations available for the content 36, and the number of virtual objects  
15 available for assignment for a given virtual object location 37.

16 Once specific virtual objects are selected for one or more available virtual object  
17 locations, the groups that should view each virtual object 38 are determined, based on the  
18 target category of interest. For example, in target category ADI, and group Los Angeles, CA,  
19 a virtual object related to a Los Angeles area professional basketball team may be considered  
20 appropriate as an advertisement for professional basketball while in the group Washington,  
21 D.C., a virtual object related to a Washington, D.C. professional basketball team might be  
22 considered appropriate. The selected virtual object locations 37 may include all virtual object  
23 locations, or a subset of all the virtual object locations. A retrieval plan is generated by the  
24 retrieval plan generator 1275 which provides information concerning which target category and  
25 group is assigned to each virtual object 38 associated with each virtual object location 37. The  
26 retrieval plan may provide information for one virtual object location 37 or multiple virtual  
27 object locations within content 36, where one or more virtual objects, target categories, and

1 the groups to which each virtual object 38 is targeted within each virtual object location 37 is  
2 also provided in the retrieval plan. An example retrieval plan is provided in Table C below.  
3 Retrieval plans may be distributed along with the virtual objects and the associated content 36  
4 directly to the reception sites by the delivery processor 1300 or using the object delivery center  
5 15. Alternatively, a retrieval plan may be distributed by the delivery processor 1300 or using  
6 the object delivery center 15 independent of the associated content 36 or virtual objects.

7 After the reception site 30 receives and stores the virtual objects and the retrieval plan,  
8 the reception site 30 inserts those virtual objects into the appropriate virtual object locations  
9 in the content 36 based on the retrieval plan. The reception site 30 may retrieve and store only  
10 those virtual objects associated with that reception site's group assignment for that virtual object  
11 location 37. Alternatively, the reception site 30 may retrieve and store all virtual objects but  
12 only insert those virtual objects into virtual object locations as dictated by the retrieval  
13 plan.

14 When the virtual objects are displayed within the content 36, the reception site 30 will  
15 store virtual objects viewed data indicating that a virtual object 38 was shown. In an  
16 embodiment, the reception site 30 will store this virtual object viewed data only if the virtual  
17 objects are displayed for a predetermined time, or only if the subscriber takes an action to  
18 indicate the virtual object 38 has been viewed, such as by selecting an interactive virtual object  
19 38, for example. Accumulated virtual objects viewed data may be used by a reception site 30  
20 in conjunction with the group assignment rules.

21 The virtual object targeting system 1220 receives requests from the metadata extractor  
22 processor 1200 to initiate the determination of virtual objects to be placed. The metadata  
23 extractor processor 1200 receives content 36 and associated virtual object information from  
24 the virtual object selector 200 (Figure 5). The virtual object targeting system 1220 provides  
25 outputs to the content and virtual object packager 1260 and the retrieval plan generator 1275.

26 A part of the TVOMS 300 operation is the collection of viewing population data, and  
27 the assimilation of the viewing population data into the virtual objects selection method. This



1 operation typically includes two steps. First, viewing population data is retrieved from various  
2 sources. The viewing population data is then compiled and sent to the viewing population data  
3 collection engine 1202 in the operations center 10. Once assembled, the data is filtered for  
4 each application of the TVOMS 300. In an embodiment, the viewing population information  
5 database 1210 receives inputs from the viewing population data collection engine 1202 and a  
6 configuration set-up system 1205. The viewing population information database 1210 provides  
7 outputs to the configuration set-up system 1205, and the virtual object targeting system 1220.

8 In addition to demographic information gathered, the viewing population information  
9 can be compiled using other methods. For instance, viewing population information can be  
10 gathered using questionnaires sent by mail to subscribers or collected over the telephone from  
11 subscribers and subsequently entered in the viewing population information database 1210.  
12 Subscriber preference information may be collected in surveys, including information such as  
13 sex, age, place of birth, place of lower school education, employment type, level of education,  
14 amount of television program viewing per week, and the number of television shows in  
15 particular categories that the subscriber watches in a given week such as, sports, movies,  
16 documentaries, sitcoms, amount of Internet use and favorite web sites, etc. Any demographic  
17 information that will assist the TVOMS 300 in targeting virtual objects may be collected. The  
18 viewing population data collection engine 1202 may gather marketing information from various  
19 sources and index the information for inclusion in the viewing population information database  
20 1210.

21 To maintain the viewing population information database 1210 within the TVOMS 300,  
22 a database server 1190, communications server 1191, subscriber workstation 1192 or  
23 stations, or the suitable equivalents thereof, may be used, as depicted in Figure 11. The  
24 database server 1190 supports saving database files, event logging, event scheduling, database  
25 server services, and database security access.

26 The communications server 1191 performs the following functions on database data:  
27 integrity check, filtering, processing, and uploading viewing population data from external

1 sources using the viewing population data collection engine 1202. The workstation 1192  
2 allows for operator viewing and entry of viewing population data into the viewing population  
3 information database 1210.

4 Figure 12 shows an example of the configuration set-up system 1205 in more detail.  
5 An interface 1206 receives viewing population information. The interface 1206 can include a  
6 workstation, such as the workstation 1209, for example, from which an operator manually  
7 enters viewing population information. Alternately, viewing population information can be  
8 automatically entered at the interface 1206 by downloading from an off-site database, the  
9 Internet, a storage medium, such as a CD-ROM or a floppy disk, or by collecting the  
10 information directly from the external sources using the viewing population data collection  
11 engine 1202. A processor 1207 processes the received viewing population information and  
12 organizes the information for use. For example, the processor 1207 may create a  
13 Category/Group Definition Matrix as presented in Table A and generate the group assignment  
14 rules that can be used to target virtual objects to groups of reception sites. The  
15 Category/Group Definition Matrix and group assignment rules will be described in more detail  
16 later. The Category/Group Definition Matrix and group assignment rules and organized viewing  
17 population information are then stored in a database 1208, and are periodically updated as  
18 viewing population information or group assignment rules, for example, change.

19 The information gathered by the configuration set-up system 1205 can come from a  
20 variety of sources including marketing databases, survey inputs from the subscribers, data  
21 collected by the viewing population data collection engine 1202, and other sources. The  
22 processor 1207 will assign category numbers to target categories. For example, the ADI could  
23 be assigned category 1 and household (HH) income could be assigned category 2. Next, the  
24 configuration set-up system 1205 creates a number of non-overlapping groups for each  
25 category. For example, ADI can be broken down into Seattle, WA, Washington D.C.,  
26 Denver CO., Los Angeles CA, etc. Similarly, HH income can be broken down into a number  
27 of income groups such as no income, 20-40K, 40-60K, 60-120K, and over 120K. Then, the

configuration set-up system 1205 assigns a "group mask representation" for each group within every category. The group mask representation may be simply a binary number that can be used to identify a particular group. Table A shows a completed Category/Group Definition matrix that could be used by the virtual object targeting system 1220 to assign targeted virtual objects to groups of reception sites.

Table A - Category/Group Definition Matrix

Category Number	Category Name	Group Number	Group Definition	Group Mask Representation
1	ADI	1	Seattle, WA	1000000000
		2	Washington, D.C.	0100000000
		3	Denver, CO	0010000000
		4	Los Angeles, CA	0001000000
2	HH income	1	No income	1000000000
		2	20-40K	0100000000
		3	40-60K	0010000000
		4	60-120K	0001000000
3	Category x	1	Group a	1000000000
		2	Group b	0100000000
		3	Group c	0010000000
		4	Group d	0001000000
		5	Group e	0000100000
		6	Group f	0000010000

The processor 1207 also generates the group assignment rules for distribution to reception sites. The group assignment rules allow for the assignment of a group number to each reception site 30 for each target category based on information collected and stored at the reception site 30. The information used in conjunction with the group assignment rules is maintained in a subscriber database within the group assignment rules processor 735 at the reception site 30. Each reception site 30 populates its subscriber database through a variety of means, including subscriber input via a user interface at the reception site 30. Subscriber

inputs may be driven by reception site prompts upon receipt of group assignment rules from the operations center 10 or other on-screen questionnaires generated by the reception site 30. The subscriber database may be populated automatically by the reception site 30 as events take place at the reception site such as programs are watched by the subscriber or selected for recording, virtual objects are viewed by the subscriber, PPV events are purchased, interactive virtual objects are selected, or based on Internet usage. Alternatively, upon installation of the reception site 30, an installer or the subscriber may complete an installation process that results in the subscriber database being populated. Additionally, the reception site 30 may contain, or interface to, a Global Positioning Satellite (GPS) receiver that may provide accurate reception site location information that is stored in the subscriber database for use in locality-based targeting. Subscriber database information may also come from external sources such as downloads from the Internet or, from the operations center 10 or local insertion center 20 using group assignment rules. Information contained in the subscriber database at the reception site 30 may include the following:

Reception system identification information

Reception site type

Date of system set-up

Household income

User data (for each registered subscriber), including:

Name

Sex

Age

Place of birth

Education

Profession

TV program preferences

Demographic information

1 Past virtual objects viewed data, number of times viewed, time spent viewing  
2 Past products ordered, along with time, date, and method of order  
3 Past billing information  
4 Past TV programs watched data, along with time and date  
5 Past PPV programs ordered data, along with time and date  
6 Mood indicators entered at time of reception site turn on  
7 Form-based questionnaire results from subscriber  
8 Group assignments per subscriber for each target category  
9 Past virtual objects delivered to subscriber, date of delivery, method of delivery  
10 Zip+4 information  
11 Household location or address  
12 Number of subscribers in household  
13 Responses to prompts from past group assignment rules interactions  
14 Group assignment rules can be distributed that manipulate the subscriber database for  
15 example by adding an additional field or additional fields to the subscriber database at reception  
16 sites. If the new field requires the subscriber to provide information and the reception site 30  
17 is capable of prompting the subscriber and the subscriber is willing to provide the information,  
18 the reception site 30 will prompt the subscriber to enter the necessary information required for  
19 the newly added field or fields of data. If the new field or fields require the reception site 30  
20 to begin automatically tracking new information to populate the field, the group assignment rule  
21 processor 735 will begin to collect the requisite information at the reception site and store the  
22 information in the subscriber database at the reception site 30.  
23 Group assignment rules may also be used to place values in a subscriber database field  
24 or subscriber database fields based on the contents of another subscriber database field or  
25 other subscriber database fields.

Group assignment rules may also be used to assign a reception site to a group within a target category based on the value of a subscriber database field or combination of subscriber database fields.

What follows below is an embodiment of the group assignment rules used to associate reception sites to groups for target category X using as an example the Category / Group Definition Matrix presented in Table A. As an example, a group assignment rule may be created and distributed that results in the subscriber database being configured to track the sex of the subscriber (male or female) and the profession of the subscriber (doctor, lawyer, construction worker, college professor, teacher, or other). The delivery of this group assignment rule information may result in the subscriber at the reception site 30 being prompted to respond via an onscreen menu as to the subscriber's sex and profession. If this information is already stored in the subscriber database as a result of prior interactions, no prompt of the subscriber would be initiated by the reception site 30. Alternatively, a group assignment rule may be created and distributed that uses information automatically collected at the reception site 30, such as programs watched information, to impute a sex and profession for a reception site 30 based on the distributed group assignment rules. For example, research may indicate that women are more likely to watch professional billiards, so a group assignment rule can be created and distributed that dictates that if a reception site 30 has viewed any professional billiards, then the sex of the subscriber can be set to "female". Similarly, if research indicated that only doctors tend to select interactive virtual objects regarding toothpaste coupons, a group assignment rule can be created and distributed that dictates that if a reception site 30 has selected any interactive virtual objects for toothpaste coupons, then the profession of the subscriber can be set to "doctor." Group assignment rules can be created that then assign, for each group in a target category, the specific characteristics of a subscriber that are necessary for a reception site 30 to be assigned to each group. For target category X of Table A, as an example, group assignment rules can be created and distributed that specifically assign male doctors and male lawyers to Group B, female doctors and female lawyers to Group C, male

construction workers to Group D, female construction workers to Group E, teachers and college professors to Group F, and anyone else to Group A. Table B below presents an example of the group assignment rules that would result in this assignment of reception sites to groups.

As can be seen from this example, group assignment rules can be created to flexibly manage the subscriber databases within reception sites remotely, while maintaining the privacy and security of the actual data at the reception site 30. For example, a group assignment rule may be based on how many times a certain virtual object 38 or several related virtual objects have been viewed at the reception site 30, allowing for the next in the sequence of virtual objects to be displayed at the reception site 30 once a requisite number of viewings of subsequent virtual objects have been achieved.

Table B - Example Group Assignment Rules

Condition (IF)	Action (THEN)	Otherwise (ELSE)
If "Sex field in subscriber database" = "Male" AND "profession field in subscriber database" = "Doctor" OR "Lawyer"	Then assign reception site to Group B for Target Category 3	Else, go to the next rule
If "Sex field in subscriber database" = "Female" AND "profession field in subscriber database" = Doctor" OR "Lawyer"	Then assign reception site to Group C for Target Category 3	Else, go to the next rule
If "Sex field in subscriber database" = "Male" AND "profession field in subscriber database" = "construction worker"	Then assign reception site to Group D for Target Category 3	Else, go to the next rule
If "Sex field in subscriber database" = "Female" AND "profession field in subscriber database" = "construction worker"	Then assign reception site to Group E for Target Category 3	Else, go to the next rule

Condition (IF)	Action (THEN)	Otherwise (ELSE)
"If "profession field in subscriber database" = "teacher" OR "college professor"	Then assign reception site to Group F for Target Category 3	Else, go to the next rule
	Then assign reception site to Group A for Target Category 3	End

Figure 13 shows an embodiment of the virtual object targeting system 1220 in more detail. A resource management engine 1305 uses information from a metadata extractor processor 1200 and an available virtual object database 1265 (see Figure 9) to determine the number of virtual objects to be assigned to a given virtual object location 37. A virtual object placement engine 1307 decides which virtual objects to place in virtual object locations in the content 36. A group assignment engine 1309 determines which groups will view specific virtual objects. The virtual object placement engine 1307 receives information from the resource management engine 1305 related to the number of virtual objects available, how many virtual objects are to be provided for a given virtual object location 37, and the actual type of virtual objects available.

The resource management engine 1305 functions to divide available delivery bandwidth among multiple virtual objects for a given virtual object location 37 in the content 36. Because there may be a limited amount of resources on the delivery network 11 to deliver virtual objects with the content 36, the resource management engine 1305 may assign the available bandwidth optimally for the virtual objects associated with the individual virtual object locations within the content 36 being delivered over the communication channels. Some virtual object locations may be assigned multiple virtual objects, each targeted to a different group or groups, whereas other virtual object locations may be assigned only a single virtual object 38.

Referring to Table A, four group numbers (i.e., 1-4) are shown for the category of targeted virtual objects, ADI. For a particular virtual object location 37 in the content 36, the



four groups can be divided into two, one for each available virtual object 38 of two total, with groups 1 and 2 receiving virtual object A and groups 3 and 4 receiving virtual object B, as shown for virtual object location 1. A retrieval plan for this later example is shown in Table C.

Table C - Retrieval Plan

Virtual Object Location	Target Category	Virtual Object To Retrieve	Groups Assigned to Specific Virtual Object	Group Mask Assignment
Virtual Object Location 1	ADI	Virtual Object A	1, 2	1100000000
		Virtual Object B	3,4	0011000000
Virtual Object Location 2	HH Income	Virtual Object A	1,2,3	1110000000
		Virtual Object B	4	0001000000
Virtual Object Location 3	Category x	Virtual Object A	1,2	1100000000
		Virtual Object B	3	0010000000
		Virtual Object C	4	0001000000
		Virtual Object D	5	0000100000
		Virtual Object E	6	0000010000
Virtual Object Location 4	All	Virtual Object A	All	1111111111

After determining how many virtual objects will be needed for each virtual object location 37 within the content 36, the resource management engine 1305 may also account for the type of available targeted virtual objects for display and the variety of subscribers (according to group assignment numbers) who may be viewing the content 36. An advertiser or content provider may provide this information when forwarding virtual objects for insertion.

1 In an embodiment, the virtual object placement engine 1307 determines which specific virtual  
2 objects are to be placed in each available virtual object location 37 within the content 36. The  
3 virtual object placement engine 1307 first receives the list of selected available virtual objects  
4 from the metadata extractor processor 1200 (Figure 9). In cooperation with the resource  
5 management engine 1305, the virtual object placement engine 1307 then determines which of  
6 the available virtual objects should be placed in each virtual object location 37 within the  
7 content 36. For example, if the preferred target category for virtual object location 1 is ADI,  
8 the virtual object placement engine 1307 will select one or more targeted virtual objects  
9 determined by the metadata extractor processor 1200 to place in that virtual object location  
10 37. If the demographic or other data assembled by the configuration set-up system 1205  
11 indicates that more than one targeted virtual object 38 should be placed, depending on the  
12 ADI, then the virtual object placement engine 1307 will select the appropriate number of  
13 targeted virtual objects, and will assign each targeted virtual object 38 to the specific virtual  
14 object location 37. The operation of the virtual object placement engine 1307 to assign the  
15 targeted virtual objects will be described in more detail later.

16 In an embodiment, the group assignment engine 1309 receives inputs from the resource  
17 management engine 1305 and the virtual object placement engine 1307 and then determines  
18 which target category groups will view specific targeted virtual objects. Thus, for each virtual  
19 object location 37, the group assignment engine 1309 assigns groups of reception sites to each  
20 of the virtual objects. The reception sites may be assigned based on their placement within a  
21 group (i.e., based on their group assignment number) as defined by the group assignment rules  
22 received from the operations center 10. In table C, the assignments are shown based on the  
23 group assignment numbers. As also shown in Table C, the group addressing for a virtual object  
24 location 37 may be based on a single category of targeting. This may avoid a conflict regarding  
25 which virtual object 38 a reception site 30 may retrieve.

26 The group assignment engine 1309 provides an output to the retrieval plan generator

1 1275. The output indicates which group assignment numbers (i.e., which groups of reception  
2 sites) are assigned to a virtual object 38 for a given virtual object location 37 in the content 36.  
3 The retrieval plan generator 1275 then generates a bit word, or group mask assignment, that  
4 is used to assign the groups to virtual objects. Once generated, the retrieval plan is provided  
5 to the delivery processor 1300 for distribution along with the content 36 and the actual virtual  
6 objects to reception sites by object delivery center 15.

7 In an embodiment, the virtual object targeting system 1220 provides a virtual object  
8 generation request command 1261 to the content and virtual object packager 1260. The  
9 virtual objects generation request command 1261 specifies which particular virtual objects are  
10 to be displayed in a particular virtual object location 37, and the actual location of the virtual  
11 objects. The virtual object 38 is then retrieved from the available virtual object database 1265.  
12 The virtual objects, along with the retrieval plan, and content 36 and associated metadata  
13 packets are provided to the delivery processor 1300 for delivery to the appropriate reception  
14 sites.

15 When a reception site 30 receives the content 36 that contains targeted virtual objects,  
16 software instructions operating on the reception site 30 analyze the contents of the retrieval  
17 plan. Then, based on the groups assigned for each virtual object 38, the reception site 30  
18 retrieves those virtual objects that match its own group assignments for the target category  
19 being used for the virtual object location 37. The reception site 30 then associates those virtual  
20 objects retrieved with the appropriate virtual object location 37 where the virtual object 38 will  
21 be placed, so that when the content 36 is viewed, the virtual object 38 assigned to that virtual  
22 object location 37 is displayed.

23 An embodiment of the process for assigning targeted virtual objects using the virtual  
24 object placement engine 1307 is presented in Figure 14. The process begins with block 2360.  
25 In block 2362, the reception sites are assigned to groups based on distributed group  
26 assignment rules. In block 2364, the virtual object placement engine 1307 ties or relates virtual

1 object locations in content 36 to the groups. In block 2366, the virtual object placement engine  
 2 1307 ties or relates virtual objects to groups. In block 2368, the virtual object placement  
 3 engine 1307 determines how many virtual objects to assign to a virtual object location 37. In  
 4 block 2370, the virtual object placement engine 1307 determines which target category to use  
 5 for one or more virtual object locations 37. In block 2372, the virtual object placement engine  
 6 1307 determines specific virtual objects to be placed in the virtual object locations 37. In  
 7 block 2374, the virtual object placement engine 1307 determines which groups to assign to the  
 8 virtual objects 38 for the selected virtual object locations 37. The process ends with block  
 9 2376.

10 As discussed above, virtual object targeting uses target categories and groups within  
 11 each target category to tie or relate three entities together: 1) the reception site 30; 2) virtual  
 12 objects; and 3) virtual object locations in content 36. In one embodiment of block 2362 in  
 13 Figure 14, the reception sites are assigned to groups for each target category by the  
 14 configuration set-up system 1205 using the distribution of group assignment rules on which each  
 15 reception site 30 assigns itself to a group for each target category.

16 In one embodiment of block 2364 in Figure 14, virtual object locations in content 36  
 17 are tied or related to groups as described below. For each virtual object location 37, a group  
 18 breakdown percentage can be defined for each group that represents the likely compatibility  
 19 of the content 36 surrounding that virtual object location 37 with each group. Breakdown  
 20 percentages for each virtual object location 37 are defined within the virtual object selector 200  
 21 (see Figure 8) and passed to the TVOMS 300. Table D shows a sample breakdown of these  
 22 group breakdown percentages for five example virtual object locations for three example target  
 23 categories.

24 The group breakdown percentage data may be derived from information resident in the  
 25 viewing population information database 1210 or a number of sources including surveys, and  
 26 program ratings services such as Nielsen or Arbitron, for example. In this example, the group

assignment numbers are the same as those presented in Table A. Thus, target categories 1 and 2 each have four groups associated with them, and target category 3 has six groups associated with it. For virtual object location 1, the target category 1 refers to ADI and under group 1, a group breakdown percentage of 25 percent is assigned for group 1 from the target category ADI since 25 percent of the subscribers reside in the Seattle, WA ADI. The group breakdown percentages for each target category for each virtual object location 37 may sum to 100 percent.

In an embodiment of the subroutine represented by block 2366 of Figure 14, virtual objects may be ranked according to their potential revenue generation for each group within one and up to all possible target categories, again using percentages. This information may be provided by an advertiser, programmer, or content provider responsible for the virtual objects and may reside in the available virtual objects database 1265. Information resident in the viewing population information database 1210 may be used to assign virtual object ranking percentages. Table E shows a sample assignment of virtual object ranking percentages for eight sample virtual objects using the same target categories and group numbers as in Table D. Not all virtual objects may be assigned to groups for a target category if an advertiser or programmer does not wish its virtual objects to be targeted in the manner required by that target category. For example, an advertiser or programmer may want the same virtual object to be displayed at all reception sites 30, regardless of subscriber group information or characteristics.

Table D - Virtual Object Location Group Breakdown Percentages

Virtual object location	Target Category	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Virtual object location 1	1	25	25	25	25	N/A	N/A

Virtual object location	Target Category	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
“	2	30	10	20	40	N/A	N/A
“	3	10	20	30	40	N/A	N/A
Virtual object location 2	1	10	20	30	40	N/A	N/A
“	2	25	25	25	25	N/A	N/A
“	3	10	15	25	25	15	10
Virtual object location 3	1	40	30	20	10	N/A	N/A
“	2	80	10	5	5	N/A	N/A
“	3	25	25	10	10	15	25
Virtual object location 4	1	50	0	50	0	N/A	N/A
“	2	0	40	40	20	N/A	N/A
“	3	10	10	25	25	15	15
Virtual object location 5	1	20	30	30	20	N/A	N/A
“	2	30	30	10	30	10	10
“	3	10	30	10	30	10	10

Referring to Table E, the data indicates that for virtual object 1, and target category 1 (ADI), the advertiser believes that virtual object 1 is appropriate for the subscribers in groups 1 and 2 and is not appropriate for the subscribers in groups 3 and 4. The advertiser also

believes that virtual object 1 is equally appropriate for both the group 1 and the group 2 subscribers. However, if the group 1 subscribers are determined to be more likely to respond to virtual object 1 than the group 2 subscribers, then group 1 could be given a higher percentage than group 2. Table E also shows that virtual object 1 is not applicable to groups 5 and 6 because only four groups are defined for the target category ADI. Thus, all the reception sites will be grouped into one of groups 1 through 4.

Using this paradigm, virtual objects can be targeted using at least two methods. The first is a designated multi-virtual object campaign where specific unique sets of groups are assigned for each virtual object 38 of the campaign. In the second method, each virtual object 38 provided by an advertiser is independently associated with groups. Virtual objects from several different advertisers are then used together to optimize use of virtual object locations.

Table E - Virtual Object Ranking Percentages

Virtual Object	Target Category	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Virtual object 1	1	50	50	0	0	N/A	N/A
"	2	30	10	20	40	N/A	N/A
"	3	0	0	0	0	0	0
Virtual object 2	1	0	0	50	50	N/A	N/A
"	2	0	0	0	0	N/A	N/A
"	3	0	0	0	0	0	0
Virtual object 3	1	0	0	0	0	N/A	N/A
"	2	25	25	25	25	N/A	N/A
"	3	0	0	0	0	0	0
Virtual object 4	1	50	0	50	0	N/A	N/A
"	2	0	40	40	20	N/A	N/A
"	3	10	30	10	30	10	10
Virtual object 5	1	40	20	20	40	N/A	N/A
"	2	10	30	30	30	N/A	N/A
"	3	30	30	30	5	5	0
Virtual object 6	1	0	0	0	0	N/A	N/A
"	2	0	0	0	0	N/A	N/A
"	3	10	10	10	10	30	30
Virtual object 7	1	20	40	40	20	N/A	N/A
"	2	25	25	25	25	N/A	N/A
"	3	0	30	20	30	0	20
Virtual object 8	1	30	40	0	30	N/A	N/A
"	2	30	30	10	30	N/A	N/A
"	3	20	0	20	20	20	20

As depicted in Figure 14, blocks 2368, 2370, 2372, and 2374, the virtual object placement engine 1307 determines: 1) how many virtual objects are assigned to which virtual object location; 2) which target category is used for which virtual object location; 3) which virtual objects to place in each virtual objects location; and 4) which groups are assigned to which virtual objects, respectively. To limit the need for excessive distribution bandwidth to distribute virtual objects to reception sites, the algorithm in the virtual object placement engine 1307 that assigns targeted virtual objects to the virtual objects assumes that there is a total number of virtual objects available [TOTAL\_VIRTUAL OBJECTS] for a segment of content 36 (across all virtual object locations), and assumes that no more than some maximum number of the virtual objects can be or are desired to be assigned to a given virtual object location 37. This amount is denoted as [MAX\_VIRTUAL OBJECTS].

Figure 15 presents an embodiment of a process used by the virtual object placement engine 1307 to execute the functions listed in blocks 2368, 2370, 2372, and 2374 depicted in Figure 14. The process begins with the start ellipse, 2318. In block 2320, the virtual object placement engine 1307 determines the virtual object 38 best suited for each virtual object location 37 for all target categories. In block 2322, the virtual object placement engine 1307 determines the best virtual object/target category combination for each virtual object location 37. In block 2324, the virtual object placement engine 1307 compares virtual object/target category combinations for all virtual object locations. In block 2326, the virtual object placement engine 1307, for a virtual object location 37 and target category, determines the best virtual objects to associate with the virtual object location 37. In block 2328, the virtual object placement engine 1307 repeats block 2326 for each target category. In block 2330, the virtual object placement engine 1307 determines the target category that yields the optimum placement of virtual objects for a virtual object location 37. In block 2332, the virtual object placement engine 1307 repeats blocks 2326, 2328, and 2330 for all virtual object locations. In block 2334, the virtual object placement engine 1307 determines the best combination of multiple



1 virtual objects for each virtual object location 37. In block 2336, for the remaining virtual  
2 object locations, the virtual object placement engine 1307 assigns the best matching virtual  
3 object 38. The process ends with block 2338.

4 A further embodiment of a virtual objects targeting algorithm presented in Figure 15  
5 will be described with reference to the example values shown in Tables A-E. Various other  
6 prioritizing or ranking schemes may be used as described later.

7 Step 1: In block 2320 in Figure 15, the virtual object placement engine 1307, for a  
8 virtual object location 37, determines the virtual objects with the highest overall ranking if that  
9 virtual object 38 were the only virtual object 38 to be placed in a virtual object location 37 in  
10 the content 36. This step compares the data in Tables D and E. Figure 16 and the description  
11 that follows below present a more detailed embodiment of several of the blocks presented in  
12 Figure 15. In step 1a, as an embodiment of block 2421 in Figure 16, the virtual object  
13 placement engine 1307 selects the first virtual object location 37 and as an embodiment of  
14 block 2421 in Figure 16, selects the first virtual object 38 to be analyzed. As Step 1b, for that  
15 virtual object selected in Step 1a, the virtual object placement engine 1307 selects the first  
16 category, as an embodiment of block 2423 in Figure 16. Then, the virtual object placement  
17 engine 1307 multiplies the virtual object's Group Ranking Percentage by the virtual object  
18 location's Group Breakdown Percentage for each group as an embodiment of block 2424 in  
19 Figure 16 and sums the result, as an embodiment of block 2425 in Figure 16. As Step 1c, the  
20 virtual object placement engine 1307 repeats Step 1b for the next target category, as an  
21 embodiment of block 2426 in Figure 16. As Step 1d, the virtual object placement engine 1307  
22 repeats steps 1b and 1c for each virtual object 38, as an embodiment of block 2427 in Figure  
23 16. As Step 1e, for the virtual object location 37 under consideration, the virtual object  
24 placement engine 1307 selects the virtual object/target category that yields the highest summed  
25 value, as an embodiment of block 2428 in Figure 16. Then, for Step 1f, the virtual object

placement engine 1307 repeats Steps 1b-1e for all virtual object locations, as an embodiment of block 2429 in Figure 16.

For example, using virtual object location 1, virtual object 1:

target category 1:  $50*25 + 50*25 + 0*25 + 0*25 = 25\%$

target category 2:  $30*30 + 10*10 + 20*20 + 40*40 = 30\%$

target category 3:  $0*10 + 0*10 + 0*20 + 0*20 + 0*20 + 0*20 = 0\%$

The cross-multiplied result then shows a measure of effectiveness for each virtual object 38 if displayed in the corresponding virtual object location 37. Table F below presents the results of Step 1 above for virtual object location 1.

Table F

Virtual object location/ Virtual object	T a r g e t Category	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Sum- mation
1 / 1	1	12.5	12.5	0	0	0	0	25
	2	9	1	4	16	0	0	30
	3	0	0	0	0	0	0	0
1 / 2	1	0	0	12.5	12.5	0	0	25
	2	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0
1 / 3	1	0	0	0	0	0	0	0
	2	7.5	2.5	5	10	0	0	25
	3	0	0	0	0	0	0	0
1 / 4	1	12.5	0	12.5	0	0	0	25
	2	0	4	8	8	0	0	20

Virtual object location/ Virtual object	Target Category	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Sum- mation
	3	1	3	2	6	2	2	16
1 / 5	1	10	5	5	5	0	0	25
	2	3	3	6	12	0	0	24
	3	3	3	6	1	1	0	14
1 / 6	1	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0
	3	1	1	2	2	6	6	18
1 / 7	1	5	5	10	5	0	0	25
	2	7.5	2.5	5	10	0	0	25
	3	0	3	4	6	0	4	17
1 / 8	1	7.5	10	0	7.5	0	0	25
	2	9	3	2	12	0	0	26
	3	2	0	4	4	4	4	18

Step 2: Returning to Figure 15, for each virtual object location 37, the virtual object placement engine 1307, in block 2322, determines the virtual object/target category combination that results in the highest overall ranking. In one embodiment the virtual object placement engine 1307, lists the virtual object locations, the overall ranking, the corresponding virtual object 38, and the corresponding target category. In case of a tie, the virtual object placement engine 1307 selects any virtual object 38 with the overall highest ranking. Table G shows the results. Thus, from Table G, virtual object 4, a virtual object 38 displayed within

virtual object location 4 yields a measure of effectiveness of 50 (highest) and virtual object 8 along within virtual object location 5 yields a measure of effectiveness of 28.

Table G

Virtual Object Location	Highest Overall Ranking	Corresponding Virtual Object	Corresponding Target Category
Virtual object location 1	30	Virtual Object 1	2
Virtual object location 2	35	Virtual Object 2	1
Virtual object location 3	35	Virtual Object 1	1
Virtual object location 4	50	Virtual Object 4	1
Virtual object location 5	28	Virtual Object 8	2

Step 3: In one embodiment of block 2324 in Figure 15, the virtual object placement engine 1307 orders the resulting list of virtual object locations from Step 2 from lowest overall ranking to highest overall ranking to compare virtual object/target category combinations for virtual object locations. Table H shows the results.

Table H

Virtual Object Location	Overall Ranking	Corresponding Virtual Object	Corresponding Target Category
Virtual object location 5	28	Virtual Object 8	2
Virtual object location 1	30	Virtual Object 1	2
Virtual object location 2	35	Virtual Object 2	1
Virtual object location 3	35	Virtual Object 1	1
Virtual object location 4	50	Virtual Object 4	1

Step 4: In one embodiment of block 2326 in Figure 15, the virtual object placement engine 1307 uses the process shown in Figure 17 to determine the best virtual objects to associate with a virtual object location 37. The process begins with ellipse 2440. In block 2441 in Figure 17, the virtual object placement engine 1307 selects the virtual object location 37 from Step 3 resulting in the lowest overall ranking. As Step 4a, for the selected virtual object location 37, the virtual object placement engine 1307 selects the first target category, as an embodiment of block 2442 in Figure 17. As Step 4b, the virtual object placement engine 1307 assembles a table showing the product of each virtual object Group Ranking Percentage and virtual object location Group Breakdown Percentage combination. Table I below provides an example for virtual object location 5 and target category 1.

Table I

Virtual Object Location / Virtual Object	Target Category	Group 1	Group 2	Group 3	Group 4	Sum-mation
5 / 1	1	10	15	0	0	25
5 / 2	1	0	0	15	10	25
5 / 3	1	0	0	0	0	0
5 / 4	1	10	0	15	0	25
5 / 5	1	8	6	6	4	24
5 / 6	1	0	0	0	0	0
5 / 7	1	4	6	12	4	26
5 / 8	1	6	12	0	6	24

As Step 4c, as an embodiment of block 2443 in Figure 17, the virtual object placement engine 1307 finds the product that is the highest. In case of a tie, the virtual object placement engine 1307 selects the product that corresponds to the highest summation value for that virtual object location / virtual object combination. In case a tie still persists, the virtual object placement engine 1307 selects any of the cells with an equivalent value. Table J below shows the previous example continued where group 2 for virtual object location / virtual object combination 5/1 is selected.

Table J

Virtual Object Location/Virtual Object	Target Category	Group 1	Group 2	Group 3	Group 4	Sum-mation
5 / 1	1	10	<b>*15*</b>	0	0	25
5 / 2	1	0	0	15	10	25
5 / 3	1	0	0	0	0	0
5 / 4	1	10	0	15	0	25
5 / 5	1	8	6	6	4	24
5 / 6	1	0	0	0	0	0
5 / 7	1	4	6	12	4	26
5 / 8	1	6	12	0	6	24

Step 5: As an embodiment of block 2444 in Figure 17, the virtual object placement engine 1307 finds the product that is next highest (or the same value as in Step 4), but that is associated with a group not yet selected. Again, in case of a tie, the virtual object placement engine 1307 selects the product that corresponds to the highest summation value for that virtual

object location / virtual object combination. In case a tie still persists, the virtual object placement engine 1307 selects any of the cells with an equivalent value. Table K below shows the previous example continued.

Table K

Virtual Object Location / Virtual Object	Target Category	Group 1	Group 2	Group 3	Group 4
5 / 1	1	*10*	*15*	0	0
5 / 2	1	0	0	*15*	*10*
5 / 3	1	0	0	0	0
5 / 4	1	10	0	15	0
5 / 5	1	8	6	6	4
5 / 6	1	0	0	0	0
5 / 7	1	4	6	12	4
5 / 8	1	6	12	0	6

Step 6: As an embodiment of block 2446 in Figure 17, the virtual object placement engine 1307 repeats Step 5 until a product has been selected for all groups. Table L below continues the example.

Table L

Virtual Object Location / Virtual Object	Target Category	Group 1	Group 2	Group 3	Group 4
5 / 1	1	*10*	*15*	0	0

Virtual Object Location / Virtual Object	Target Category	Group 1	Group 2	Group 3	Group 4
5 / 2	1	0	0	<b>*15*</b>	<b>*10*</b>
5 / 3	1	0	0	0	0
5 / 4	1	10	0	15	0
5 / 5	1	8	6	6	4
5 / 6	1	0	0	0	0
5 / 7	1	4	6	12	4
5 / 8	1	6	12	0	6

Step 7: As an embodiment of block 2448 in Figure 17, for all virtual objects with products cells selected in Step 6, the virtual object placement engine 1307 calculates the summed products of those selected cells for each virtual object 38. Table M below shows the results.

Table M

Virtual Object Location / Virtual Object	Target Category	Group 1	Group 2	Group 3	Group 4	Sum- mation
5 / 1	1	<b>*10*</b>	<b>*15*</b>	0	0	<b>25</b>
5 / 2	1	0	0	<b>*15*</b>	<b>*10*</b>	<b>25</b>
5 / 3	1	0	0	0	0	0
5 / 4	1	10	0	15	0	0



Virtual Object Location / Virtual Object	Target Category	Group 1	Group 2	Group 3	Group 4	Sum- mation
5 / 5	1	8	6	6	4	0
5 / 6	1	0	0	0	0	0
5 / 7	1	4	6	12	4	0
5 / 8	1	6	12	0	6	0

Step 8: As an embodiment of block 2450 in Figure 17, the virtual object placement engine 1307 orders the virtual objects in Step 7 from highest summed value to lowest. In case of equal summed values, the virtual object placement engine 1307 arbitrarily orders those virtual objects with the same summed value. Table N presents the example results.

Table N

Virtual Object Location / Virtual Object	Target Category	Group 1	Group 2	Group 3	Group 4	Sum- mation
5 / 1	1	10	15	0	0	25
5 / 2	1	1	0	15	10	25

Step 9: As Step 9a, if the number of virtual objects selected in Step 8 exceeds [MAX\_VIRTUAL OBJECTS], the virtual object placement engine 1307 selects the first [MAX\_VIRTUAL OBJECTS] virtual objects with the summed value as an embodiment of block 2452 in Figure 17. For example, if it is desired to assign at most two virtual objects to a virtual object location 37, the virtual object placement engine 1307 selects the two virtual

objects with the highest virtual object Group Ranking Percentage and virtual object location Group Breakdown Percentage products. Next, as Step 9b, for the unselected virtual objects, the virtual object placement engine 1307 determines those groups that were associated with these omitted virtual objects, as an embodiment of block 2454 in Figure 17.

Step 10: As an embodiment of block 2456 in Figure 17, for the virtual objects associated with the groups determined in Step 9b, the virtual object placement engine 1307 selects the product within that group that is the highest for the [MAX\_VIRTUAL OBJECT] selected virtual objects from Step 9a. The virtual object placement engine 1307 recalculates the summed products of those selected groups cells for each of the virtual objects. Table O below provides a new example, assuming [MAX\_VIRTUAL OBJECTS] = 2; therefore, groups 5 and 6, which are associated with virtual object 6, may be reallocated to virtual objects 7 & 5, respectively.

Table O

Result before Step 10 is shown below:

Virtual object location/ Virtual object	Target Category	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Sum- mation
5/7	3	0	*9*	2	*9*	0	2	18
5/5	3	*3*	9	*3*	1.5	0.5	0	6
5/6	3	1	3	1	3	*3*	*3*	6

Result after Step 10 is shown below:

Virtual object location / Virtual object	Target Category	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Sum- mation
5 / 7	3	0	*9*	2	*9*	0	*2*	20
5 / 5	3	*3*	9	*3*	1.5	*0.5*	0	6.5
5 / 6	3	1	3	1	3	3	3	0

Step 11: As an embodiment of block 2458 in Figure 17, the virtual object placement engine 1307 calculates the total summed product value for all virtual objects selected in Step 10. From Table P, this value is 26.5. The resultant groups selected for each virtual object will serve as the group assignments if this virtual object location / target category ultimately results in the best match, as determined in the remaining steps of the algorithm.

Table P

Virtual object location/ Virtual object	Target Category	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Sum- mation
5 / 7	3	0	*9*	2	*9*	0	*2*	20
5 / 5	3	*3*	9	*3*	1.5	0.5	0	6.5
Total summed product values								26.5

Step 12: The virtual object placement engine 1307 repeats steps 4-11 above for the same selected virtual object location 37 of Step 4 using the remaining target categories, as an embodiment of block 2328 in Figure 15. The Table Q example below provides the output results for each of the three example target categories.

Table Q

Virtual object location / Virtual object	Target Category	Group 1	Group 2	Group 3	Group 4	Sum- mation
5 / 1	1	*10*	*15*	0	0	25
5 / 2	1	0	0	*15*	*10*	25
Total summed product values						50

Virtual object location / Virtual object	Target Category	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Sum- mation
5 / 1	2	*9*	3	2	*12*	0	0	21
5 / 4	2	0	*12*	*4*	6	0	0	16
Total summed product values								37

Virtual object location /Virtual object	Target Category	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Sum- mation
5 / 7	3	0	*9*	2	*9*	0	*2*	20

Virtual object location /Virtual object	Target Category	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Sum-mation
5 / 5	3	*3*	9	*3*	1.5	*0.5*	0	6.5
Total summed product values								26.5

Step 13: As an embodiment of block 2330 in Figure 15, the virtual object placement engine 1307 selects the target category that yields the highest total summed product amount. The virtual object placement engine 1307 assigns this as the Maximum Rank for that virtual object location 37. In the case above, the virtual object placement engine 1307 would assign target category 1, with a value of 50 that is selected.

Step 14: As an embodiment of block 2332 in Figure 15, the virtual object placement engine 1307 repeats Steps 4-13 for the virtual object location 37 selected in Step 4 with the next lowest overall ranking, computing the Maximum Rank for each virtual object location 37.

Step 15: As an embodiment of block 2334 in Figure 15, the virtual object placement engine 1307 uses the available [MAX\_VIRTUAL OBJECTS] virtual objects for the virtual object locations up to the maximum number of [TOTAL\_VIRTUAL OBJECTS] that yield the largest Maximum Rank. The virtual object placement engine 1307 makes use of the relevant target category determined in Step 13, with virtual objects as determined in Step 10, with group assignments as determined in Step 11.

Step 16: As an embodiment of block 2336 in Figure 15, for all other virtual object locations, the virtual object placement engine 1307 assigns the single virtual objects that yielded the highest Overall Ranking as determined in Step 2.

1           The above algorithm performed by the virtual object placement engine 1307 is meant  
2 to be illustrative and not limiting. Other algorithms are possible for assigning targeted virtual  
3 objects to groups of reception sites or to individual reception sites. Other targeted virtual  
4 object routines can also be used by the virtual object placement engine 1307.

5           Figure 18 depicts the object delivery center 15. The object delivery center 15  
6 receives content 36, virtual objects, retrieval plans, group assignment rules, and other  
7 information from the operations center 10 that is to be transmitted to reception sites. The  
8 communication processor 16 in the object delivery center 15 may determine the delivery  
9 network and communications methods appropriate for each item to be delivered, may combine  
10 items to be delivered to common destinations, may format the items for delivery, and provide  
11 the formatted items to the processing router 17. The processing router 17 may then route each  
12 item to the appropriate modular connector 700, for example modular connector 700', modular  
13 connector 700", or modular connector 700"', depending on the required delivery network 11  
14 and communication method.

15           A number of embodiments of delivery networks 11, 12, and 14 are presented below.  
16 The embodiments presented below may use the object delivery center 15, which inserts the  
17 virtual objects into the signal for delivery over the delivery network 11 or 12. The  
18 embodiments presented below use a modular connector 700 in the reception site 30, that  
19 receives the delivered signal with virtual objects, extracts the virtual objects, and provides the  
20 virtual objects to the storage management processor 710. The modular connector 700  
21 supports the receive functionality for each unique delivery network communication method  
22 embodiment.

23           Figure 19 presents embodiments associated with the delivery of virtual objects over  
24 a coaxial or fiber cable system 2701 to a reception site 30. Virtual objects are provided to the  
25 delivery network 11 by the object delivery center 15 or directly by the operations center 10.  
26 Alternatively, content 36 and virtual objects may be provided to the reception site 30 from the

1 object delivery center 15 or from the local insertion center 20 using delivery network 12. The  
2 signal is delivered over the cable system 2701 delivery network. The signal may provide for  
3 the delivery of virtual objects, content 36 containing virtual object locations, and group  
4 assignment rules and retrieval plans. The signal may also provide for interactive virtual object  
5 requests from the reception site 30 to the interactive object service center 60 using delivery  
6 network 14 or the signal may be a means to provide access to the Internet or other public  
7 network through which virtual objects or content 36 are delivered (not shown). The cable  
8 system 2701 may be a coaxial cable network, totally fiber network, hybrid fiber coax network,  
9 fiber to the curb network, or any other cable distribution technology. The signal over the cable  
10 system may be generated by a cable modem, in which an external cable modem 2702 is used  
11 to receive the signal and provide the embedded virtual objects to the modular connector 700  
12 in the reception site 30 for processing. Alternatively, the reception site 30 may contain an  
13 internal cable modem 2705, which receives the signal and provides the virtual objects to the  
14 modular connector 700 for processing.

15 In another embodiment, the signal delivered over the cable system is a video signal.  
16 In one embodiment, the video signal is an analog video signal. In another embodiment, the  
17 video signal is a digital video signal. The reception site 30 may contain an internal cable  
18 receiver/tuner/demodulator 2706 to process the signal, and provide the embedded virtual  
19 objects to the modular connector 700. A set top terminal 2703, or other device capable of  
20 receiving a cable video signal, such as a cable ready TV, or PC with cable tuner (not shown),  
21 may process the video signal and deliver the video signal to the connector 700 in the reception  
22 site 30, which extracts the embedded virtual objects. Alternately, the set top terminal 2703,  
23 or other such device, may extract the embedded virtual objects from the video signal and  
24 provide the virtual objects to the modular connector 700 in the reception site 30.

25 In another embodiment, virtual objects may be embedded within the audio signal,  
26 requiring an appropriate audio-capable modular connector 700 in the reception site 30 to

1 extract the virtual objects from the audio signal. In one embodiment, the audio signal is an  
2 analog audio signal. In another embodiment, the audio signal is a digital audio signal.

3 In yet another embodiment, the signal is a spread spectrum signal containing a digital  
4 data stream, requiring an appropriate spread spectrum receiver and modular connector 700  
5 in the reception site 30 to extract the virtual objects. In this embodiment, the spread spectrum  
6 signal is transmitted in the same bandwidth as the video or audio signal, but below the noise  
7 level.

8 Figure 20 presents embodiments associated with the delivery of virtual objects over  
9 a wireless broadcast system 2801 to a reception site 30. Virtual objects are provided to the  
10 delivery network 11 by the object delivery center 15 or directly by the operations center 10.  
11 Alternatively, content 36 and virtual objects may be provided to the reception site 30 from the  
12 object delivery center 15 or from the local insertion center 20 using delivery network 12. The  
13 signal is delivered over the wireless broadcast system 2801 delivery network. The signal may  
14 provide for the delivery of virtual objects, content 36 containing virtual object locations, and  
15 group assignment rules and retrieval plans. The signal may also provide for interactive virtual  
16 object requests from the reception site 30 to the interactive object service center 60 using  
17 delivery network 14 or the signal may be a means to provide access to the Internet or other  
18 public network through which virtual objects or content 36 are delivered. The wireless  
19 broadcast system may be a microwave multipoint delivery system (MMDS), local multipoint  
20 distribution system (LMDS), Instructional Television Fixed Service (ITFS) system, or any other  
21 wireless data, video, or telephony broadcast system, including point-to-point and  
22 point-to-multipoint microwave broadcast systems like those provided by Teligent, Winstar  
23 digital wireless network, and ATT's wireless system. The signal over the wireless broadcast  
24 system may be generated by a wireless modem, in which an external wireless modem 2802 is  
25 used to receive the signal and provide the embedded virtual objects to the modular connector  
26 700 in the reception site 30 for processing. Alternatively, the reception site 30 may contain an



1 internal wireless modem 2805, which receives the signal and provides the virtual objects to the  
2 modular connector 700 in the reception site 30 for processing.

3 In another embodiment, the signal delivered over the wireless broadcast system is a  
4 video signal. In one embodiment, the video signal is an analog video signal. In another  
5 embodiment, the video signal is a digital video signal. The reception site 30 may contain an  
6 internal wireless receiver/tuner/demodulator 2806 to process the signal, and provide the  
7 embedded virtual objects to the modular connector 700. A wireless set-top terminal 2803, or  
8 other device capable of receiving a wireless video signal, such as a TV, or PC with a wireless  
9 receiver and tuner, may process the video signal and deliver the video signal to the modular  
10 connector 700 in the reception site 30, which extracts the embedded virtual objects.  
11 Alternately, the set top terminal 2803, or other such device, may extract the embedded virtual  
12 objects from the video signal and provide the data to the modular connector 700 in the  
13 reception site 30.

14 In another embodiment, virtual objects may be embedded within the audio signal,  
15 requiring an appropriate audio-capable modular connector 700 in the reception site 30 to  
16 extract the virtual objects from the audio signal. In one embodiment, the audio signal is an  
17 analog audio signal. In another embodiment, the audio signal is a digital audio signal.

18 In yet another embodiment, the signal is a spread spectrum signal containing a digital  
19 data stream, requiring an appropriate spread spectrum receiver modular connector 700 in the  
20 reception site 30 to extract the virtual objects. In this embodiment, the spread spectrum  
21 signal is transmitted in the same bandwidth as the video or audio signal, but below the noise  
22 level.

23 Figure 21 presents embodiments associated with the delivery of virtual objects over  
24 a satellite broadcast system 2901 to a reception site 30. Virtual objects are provided to the  
25 delivery network 11 by the object delivery center 15 or directly by the operations center 10.  
26 Alternatively, content 36 and virtual objects may be provided to the reception site 30 from the

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1 video signal and deliver the video signal to the modular connector 700 in the reception site 30,  
2 which extracts the embedded virtual objects. Alternately, the satellite receiver 2903, or other  
3 such device, may extract the embedded virtual objects from the video signal and provide the  
4 data to the modular connector in the reception site 258.

5 In another embodiment, virtual objects may be embedded within the audio signal,  
6 requiring an appropriate audio-capable modular connector 700 in the reception site 30 to  
7 extract the virtual objects from the audio signal. In one embodiment, the audio signal is an  
8 analog audio signal. In another embodiment, the audio signal is a digital audio signal.

9 In yet another embodiment, the signal is a spread spectrum signal containing a digital  
10 data stream, requiring an appropriate spread spectrum receiver modular connector 700 in the  
11 reception site 30 to extract the virtual objects. In this embodiment, the spread spectrum  
12 signal is transmitted in the same bandwidth as the video or audio signal, but below the noise  
13 level.

14 Figure 22 presents embodiments associated with the delivery of virtual objects over  
15 a wired data network 3001 to a reception site 30. Virtual objects are provided to the delivery  
16 network 11 by the object delivery center 15 or directly by the operations center 10.  
17 Alternatively, content 36 and virtual objects may be provided to the reception site 30 from the  
18 object delivery center 15 or from the local insertion center 20 using delivery network 12. The  
19 signal is delivered over the wired data network 3001 delivery network. The signal may provide  
20 for the delivery of virtual objects, content 36 containing virtual object locations, and group  
21 assignment rules and retrieval plans. The signal may also provide for interactive virtual object  
22 requests from the reception site 30 to the interactive object service center 60 using delivery  
23 network 14 or the signal may be a means to provide access to the Internet or other public  
24 network through which virtual objects or content 36 are delivered. The wired data network  
25 3001 can be metallic wire or fiber, supporting any of a number of communication standards  
26 including HDSL, ADSL, DSL, ISDN, T1, T3, SONET, ATM, X.25, frame relay, Switched

1 MultiMegabit Data Service (SMDS), or others. The signal sent over the wired data network  
2 may be generated by a data modem or transmission device, in which the appropriate modem,  
3 interface device, or Data Terminating Equipment (DTE) device is used to receive the signal and  
4 provide the embedded virtual objects to the reception site 30 modular connector 700 for  
5 processing. Embodiments of such receiving devices are shown in Figure 22 as HDSL modem  
6 3002, ADSL modem 3003, DSL modem 3003, ISDN Terminal equipment (TE) device 3005,  
7 T1 Digital service unit (DSU) 3006, T3 DSU 3007, Fiber user network interface device (UNI)  
8 3008, ATM UNI 3009, X.25 DTE 3010, Frame relay assembler/disassembler (FRAD) 3011,  
9 and SMDS subscriber network interface device (SNI) 3012. Alternatively, the reception site  
10 30 may contain an internal modem or DTE 3013, which receives one or more signal types and  
11 provides the received signal with embedded virtual objects to the modular connector 700 in the  
12 reception site 30 for processing. Finally, the reception site 30 may be attached to a wired  
13 LAN using a transceiver. In this embodiment, virtual objects may be delivered over the LAN  
14 at any time.

15 Figure 23 presents embodiments associated with the delivery of virtual objects using  
16 the public switched telephone network (PSTN) 3101 to a reception site 30. Virtual objects  
17 are provided to the delivery network 11 by the object delivery center 15 or directly by the  
18 operations center 10. Alternatively, content 36 and virtual objects may be provided to the  
19 reception site 30 from the object delivery center 15 or from the local insertion center 20 using  
20 delivery network 12. The signal is delivered over the PSTN 3101 delivery network. The  
21 signal may provide for the delivery of virtual objects, content 36 containing virtual object  
22 locations, and group assignment rules and retrieval plans. The signal may also provide for  
23 interactive virtual object requests from the reception site 30 to the interactive object service  
24 center 60 using delivery network 14 or the signal may be a means to provide access to the  
25 Internet or other public network through which virtual objects or content 36 are delivered. The  
26 signal sent over the PSTN may be generated by a data modem or transmission device, in which

1 the appropriate modem 3102 is used to receive the signal and provide the embedded virtual  
2 objects to the modular connector 700 in the reception site 30 for processing. Alternatively, the  
3 reception site 30 may contain an internal modem 3103, which receives the signal and provides  
4 the received signal with embedded virtual objects to the modular connector 700 in the  
5 reception site 30 for processing.

6 Figure 24 presents embodiments associated with the delivery of virtual objects using  
7 wireless personal communications system (PCS) 3201 to a reception site 30. Virtual objects  
8 are provided to the delivery network 11 by the object delivery center 15 or directly by the  
9 operations center 10. Alternatively, content 36 and virtual objects may be provided to the  
10 reception site 30 from the object delivery center 15 or from the local insertion center 20 using  
11 delivery network 12. The signal is then delivered over the PCS network 3201 delivery  
12 network. The wireless PCS system may be, for example a wireless LAN, digital cellular  
13 telephony network, analog cellular telephony network, digital cellular radio system, analog  
14 cellular radio system, digital pager network, analog pager network, or Personal Communication  
15 Network (PCN). The signal may provide for the delivery of virtual objects, content 36  
16 containing virtual object locations, and group assignment rules and retrieval plans. The signal  
17 may also provide for interactive virtual object requests from the reception site 30 to the  
18 interactive object service center 60 using delivery network 14 or the signal may be a means to  
19 provide access to the Internet or other public network through which virtual objects or content  
20 36 are delivered. A wireless PCS receiver 3202 is used to receive the signal and provide the  
21 embedded virtual objects to the modular connector 700 in the reception site 30 for processing.  
22 Alternatively, the reception site 258 may contain an internal wireless PCS receiver 3203, which  
23 receives the signal and provides the received signal with embedded virtual objects to the  
24 modular connector 700 in the reception site 30 for processing.

25 Figure 25 depicts several embodiments associated with the delivery of virtual objects  
26 using a national or local television broadcaster's signal. Virtual objects are provided to either

1 the national broadcaster 1110, the broadcast affiliate 1112, or the local cable system 1114 by  
2 the object delivery center 15 or directly by the operations center 10. The signal from the  
3 national broadcaster 1110 can be delivered to reception site 30', 30" or 30''' using a satellite  
4 system 1122, using a broadcast affiliate 1112 terrestrially, or using a local cable system 1114.  
5 Alternatively, the local television broadcast affiliate 1112 can originate the signal which can be  
6 delivered to the reception site 30', 30" or 30''' terrestrially, or using a local cable system 1114.  
7 The signal may provide for the delivery of virtual objects, content 36 containing virtual object  
8 locations, and group assignment rules and retrieval plans. The signal may also provide for  
9 interactive virtual object requests from the reception sites 30', 30", and 30''' to the interactive  
10 object service center 60 using delivery network 14 or the signal may be a means to provide  
11 access to the Internet or other public network through which virtual objects or content 36 are  
12 delivered. In one embodiment, the video signal is an analog video signal and the virtual objects  
13 is embedded in the video signal. In another embodiment, the video signal is a digital video  
14 signal and the virtual objects are carried as an independent data stream. In another  
15 embodiment, virtual objects may be embedded within the audio signal. In one embodiment,  
16 the audio signal is an analog audio signal. In another embodiment, the audio signal is a digital  
17 audio signal.

18 In yet another embodiment, the signal is a spread spectrum signal containing a digital  
19 data stream, requiring an appropriate spread spectrum receiver modular connector, such as the  
20 connector 700 of Figure 27, in the reception site 30', 30" or 30''' to extract the virtual objects.  
21 In this embodiment, the spread spectrum signal is transmitted in the same bandwidth as the  
22 video or audio signal, but below the noise level.

23 Alternatively, several embodiments are associated with the delivery of virtual objects  
24 using a national or local radio broadcaster's signal. The signal from the national radio  
25 broadcaster can be delivered to the reception site 30', 30" or 30''' using the satellite system  
26 1122, or using a broadcast affiliate 1122. Alternatively, the radio broadcast affiliate 1122 can

1 originate the signal, which can be delivered to the reception site 30', 30" or 30"', terrestrially.  
2 In one embodiment, the audio signal is an analog audio signal and the virtual objects is  
3 embedded in the audio signal. In another embodiment, the audio signal is a digital audio signal  
4 and the virtual objects are carried as an independent data stream. In yet another embodiment,  
5 the virtual objects are embedded in a sub-carrier of the analog audio broadcast. In another  
6 embodiment, the signal is a spread spectrum signal containing a digital data stream, requiring  
7 an appropriate spread spectrum receiver modular connector 700 in the reception site 30', 30"  
8 or 30"' to extract the virtual objects. In this embodiment, the spread spectrum signal is  
9 transmitted in the same bandwidth as the audio signal, but below the noise level.

10 A local insertion center 20 or multiple local insertion centers may optionally be used  
11 to insert virtual objects into content 36 provided by an operations center 10 or another local  
12 insertion center 20, and any other content source. A local insertion center 20 may perform the  
13 same functions as an operations center 10. Figure 26 depicts a local insertion center 20. As  
14 shown in Figure 26, the local insertion center 20 includes a virtual object location definer 100',  
15 a virtual object selector 200', and a targeted virtual object management system 300' (TVOMS)  
16 which are identical to the virtual object location definer 100, a virtual object selector 200, and  
17 a targeted virtual object management system 300 (TVOMS) of an operations center 10. A  
18 local insertion center 20 may detect existing virtual object locations in content 36 and replace  
19 existing virtual objects with new virtual objects, delete existing virtual objects, or add new  
20 virtual objects in existing virtual object locations and target the virtual objects to reception sites  
21 or groups of reception sites. Alternatively, a local insertion center 20 may create new virtual  
22 object locations and insert and target virtual objects within these new virtual object locations  
23 using the processes defined for the operations center 10. The local insertion center 20 may  
24 modify an existing or generate a new retrieval plan and modify an existing or generate new  
25 group assignment rules for distribution to reception sites.

1           Figure 27 depicts an example of a reception site 30 in more detail. The modular  
2 connector 700 may handle all interactions with a reception site 30. Programming content 36  
3 with virtual object locations and metadata packets containing placement guidelines, mattes, and  
4 retrieval plans are received by the reception site modular connector 700 and passed to the  
5 virtual object extractor processor 780. The virtual object extractor processor 780 removes  
6 any virtual objects from the received signal and the retrieval plan information and routes the  
7 virtual objects and retrieval plan to the storage management processor 710. The storage  
8 management processor 710 uses the retrieval plan to determine which virtual objects are  
9 destined to the reception site 30 and saves the required virtual objects in virtual object storage  
10 720. In an alternative embodiment, virtual objects may be received by the reception site 30  
11 independent of the programming content 36. Group assignment rules are received by the  
12 modular connector 700 and passed to the group assignment rules processor 735. The group  
13 assignment rules processor 735 manages the reception site's subscriber database. The group  
14 assignment rules processor 735 allows the subscriber to modify information within the  
15 subscriber database either directly or through on-screen menus and prompts. The group  
16 assignment rules processor 735 allows the subscriber to review the current group assignment  
17 rules in effect for the reception site 30. The group assignment rules processor 735 allows the  
18 subscriber to override any or all of the current group assignment rules in effect at the reception  
19 site or modify any or all group assignment rules in effect at the reception site 30.

20           The programming content 36 with virtual object locations is then passed to the virtual  
21 object location detector processor 750. Information received about virtual object locations is  
22 extracted from the programming content 36 and passed to the selector processor 740 which  
23 coordinates with the storage management processor 710 to determine the appropriate virtual  
24 object 38 to place into each virtual object location 37 based on placement guidelines and  
25 available virtual objects stored in the virtual object storage 720. The storage management  
26 processor 710 retrieves the appropriate virtual object 38 for one or more virtual object location



1 37 contained in the content 36 from the virtual object storage 720. Virtual objects  
2 are passed from the storage management processor 710 to the virtual object insertion  
3 processor 760.

4 Programming content 36 with virtual object locations is passed from the virtual object  
5 location detector processor 750 to the content buffer 790 where the programming content 36  
6 is stored for a fixed period of time and then played out of the content buffer 790 to the virtual  
7 object insertion processor 760. If a virtual object 38 is available for placement in a virtual  
8 object location 37, the virtual object 38 is inserted into the appropriate virtual object location  
9 37 by the virtual object insertion processor 760.

10 In one embodiment, the virtual object location 37 may require that an embedded  
11 virtual object 38 be placed within the content 36. The virtual object insertion processor 760  
12 may use techniques for the insertion of embedded virtual objects which are described in detail  
13 in U.S. Patents 5,953,076, to Astle, Brian; and Das, Subhudev; titled System and Method of  
14 Real Time Insertions into Video Using Adaptive Occlusion with a Synthetic Reference Image;  
15 5,892,554, to DiCicco, Darrell; and Fant, Karl; entitled System and Method for Inserting  
16 Static and Dynamic Images into a Live Video Broadcast; 5,515,485, to Luquet, Andre; and  
17 Rebuffet, Michel; entitled Method and Device for Modifying a Zone in Successive Images;  
18 5,903,317, to Sharir, Avi; and Tamir, Michael; entitled Apparatus and Method for Detecting,  
19 Identifying and Incorporation Advertisements in a Video; and the MPEG4 standard, the  
20 disclosure of which are hereby incorporated by reference.

21 In another embodiment, when the virtual object location 37 may require that an  
22 overlaid virtual object 38 be placed within the content 36. The virtual object insertion  
23 processor 760 may use techniques for the overlaying of virtual objects which are described in  
24 detail in U.S. Patents 4,319,266 to Bannister, Richard S.; entitled Chroma Keying System;  
25 4,999,709 to Yamazaki, Hiroshi; and Okazaki, Sakae; entitled Apparatus for Inserting Title  
26 Pictures; 5,249,039, to Chaplin, Daniel J.; entitled Chroma Key Method and Apparatus; and

1 5,233,423 to Jernigan, Forest E.; and Bingham, Joseph; entitled Embedded Commercials  
2 within a Television Receiver using an Integrated Electronic Billboard, the disclosure of which  
3 are hereby incorporated by reference. Programming content 36 with embedded and overlaid  
4 virtual objects is passed to an optional interactive object processor 770.

5 If an external trigger is received indicating the subscriber has selected an interactive  
6 virtual object 38, the interactive object processor 770 processes the request and passes the  
7 subscriber request to the modular connector 700. The modular connector 700, in turn, passes  
8 the request to the interactive object servicing center 60. The interactive object servicing center  
9 60 will process the request and may respond back to the reception site 30 with an interactive  
10 response. Preferably, when a virtual object 38 is placed into a virtual object location 37, the  
11 selector processor 740 records the event in the placement log 730. The placement log 730  
12 provides viewing data to the group assignment rules processor 735, where the information can  
13 be used for future virtual object targeting processing. The selector processor 740 can be  
14 provided targeting algorithm updates from external sources.

15 An interactive object servicing center 60 is depicted in Figure 28. The interactive  
16 object servicing center 60 processes interactive requests and formulates responses to such  
17 requests. Figure 29 presents the process the interactive object servicing center 60 performs.  
18 The process begins with block 4500. In block 4501, the interactive object servicing center 60  
19 receives interactive requests from reception sites. In block 4502, the interactive object  
20 servicing center 60 determines the appropriate action to be performed based on the received  
21 interactive request. In block 4503, the interactive object servicing center 60 performs the  
22 appropriate action based on the received interactive request. In block 4504, the interactive  
23 object servicing center 60 replies to the requesting reception site with an interactive response.

24 As shown in Figure 28, communications to and from the interactive object servicing  
25 center 60 over a delivery network may be done using modular connector 700. An interface  
26 61 receives interactive requests from reception sites. The interface 61 can include a

1 workstation, such as the workstation 64, for example, from which an operator manually enters  
2 interactive request behavior for the interactive object servicing center 60. A processor 62  
3 processes the received interactive request, performs the appropriate action, retrieving  
4 information from database 63 to perform the actions and storing transaction information in  
5 database 63 to record the transaction event.

6 A variety of virtual object targeting delivery systems have been described. One of  
7 ordinary skill in the art will recognize that the above description is that of preferred  
8 embodiments of the invention and the various changes and modification may be made thereto  
9 without departing from the spirit and scope of the invention as defined in the following claims.

What is claimed is:

1. A method for targeting virtual advertisements at a user's terminal, comprising:
  - assigning at least one virtual advertisement spot to a program;
  - assigning one or more virtual objects to the at least one virtual advertisement spot;
  - generating a retrieval plan; and
  - providing the retrieval plan to the terminal, wherein the retrieval plan directs the terminal to select one of the one or more virtual objects.
2. The method of claim 1, further comprising:
  - defining one or more target categories; and
  - for one or more of the target categories, designating one or more groups, wherein a group is based on common viewer characteristics.
3. The method of claim 2, further comprising assigning the terminal to one or more of the groups, comprising:
  - generating group assignment rules;
  - providing the group assignment rules to the terminal;
  - storing the group assignment rules at the terminal; and
  - determining one or more group assignments based on the group assignment rules and data related to the terminal.
4. The method of claim 3, wherein the data related to the terminal includes one or more of Area of Dominant Influence (ADI), zip code+4, demographic data and programs watched data, virtual objects viewed, on-screen questionnaires and characteristics imported from marketing databases, the group assignments being updated to reflect changes in the ADI, zip

code+4, demographic data, programs watched data, virtual objects viewed, on-screen questionnaires, and characteristics imported from marketing databases.

5. The method of claim 2, wherein generating the retrieval plan comprises:  
designating a unique group mask for one or more of the groups; and  
assigning one or more of the groups to one of the virtual objects, wherein the group mask indicates whether the terminal displays a particular virtual object.

6. The method of claim 2, wherein the retrieval plan and the group assignment rules are sent periodically to the terminal.

7. A method of targeting virtual objects, comprising:  
providing a program containing one or more virtual object locations;  
providing virtual objects for one or more of the virtual object locations;  
providing alternate virtual objects for one or more of the virtual object locations; and  
generating a retrieval plan at one or more viewer's terminals, wherein the retrieval plan designates which of the one or more virtual object locations displays an alternate virtual object.

8. The method of claim 7, wherein the program is a television program.

9. The method of claim 7, wherein the program is one of an advertisement, an electronic program guide, and an Internet web page.

10. The method of claim 7, wherein at least one of the virtual object locations is fixed in position across frames of the program.

1 11. The method of claim 7, wherein at least one of the virtual object locations moves  
2 spatially in the program with time.

3 12. The method of claim 7, wherein at least one of the virtual objects is interactive.

4 13. The method of claim 7, wherein the program is broadcast to the terminals, further  
5 comprising:

6 creating categories of virtual objects and programs;

7 within one or more of the categories, defining one or more groups;

8 generating group assignment rules based on common viewer characteristics;

9 providing the group assignment rules to one or more of the terminals;

10 storing the group assignment rules in one or more of the terminals;

11 using the stored group assignment rules, assigning one or more of the terminals to one  
12 or more of the groups; and

13 comparing the retrieval plan to the group assignments to determine virtual objects to  
14 display in the one or more virtual object locations.

15 14. The method of claim 13, wherein generating the retrieval plan, comprises:

16 assigning the virtual objects to the one or more virtual object locations;

17 assigning the alternate virtual objects to at least one of the one or more virtual object  
18 locations;

19 assigning a group to one or more of the virtual objects and the alternate virtual objects;

20 and

21 creating a group mask assignment, wherein the group mask assignment is used at  
22 the terminals to compare the retrieval plan to the assignments of the terminals to the  
23 groups.

1        15.        The method of claim 14, wherein assigning the group to the virtual objects and the  
2        alternate virtual objects, comprises:

3                ranking one or more programs based on the categories of targeted virtual objects and  
4        a first percentage of total viewers who may view the one or more programs;

5                ranking the targeted virtual objects based on a second percentage of the total viewers;

6                determining, for the one or more ranked programs and the categories of targeted  
7        virtual objects, targeted virtual objects with overall highest rankings, based on the first and the  
8        second percentages;

9                assigning targeted virtual objects with the overall highest rankings to be displayed as  
10       the virtual objects; and

11               assigning targeted advertisements with lower overall rankings to be displayed as the  
12       alternate virtual objects.

13       16.        The method of claim 13, wherein the common viewer characteristics include viewer  
14       demographic information.

15       17.        The method of claim 13, wherein the common viewer characteristics include viewer-  
16       entered information.

17       18.        The method of claim 13, wherein the common viewer characteristics include programs  
18       watched data.

19       19.        The method of claim 13, wherein the common viewer characteristics include virtual  
20       objects watched data.

1       20.     The method of claim 13, wherein one or more of the virtual object locations contain  
2       an interactive virtual object, and wherein the common viewer characteristics include viewer  
3       activation of the interactive virtual object.

4       21.     The method of claim 13, wherein the terminals are television set top terminals.

5       22.     The method of claim 13, wherein one or more of the terminals is incorporated into one  
6       of a television, a personal computer and a PDA with video viewing capabilities.

7       23.     The method of claim 13, wherein one or more of the terminals is a satellite television  
8       receiver.

9       24.     The method of claim 13, further comprising:  
10       at one or more of the terminals, recording in a memory an identification of a virtual  
11       object displayed in a virtual object location;  
12       providing the identification to a remote site; and  
13       deleting the identification from the memory.

14       25.     A method of targeting virtual objects to terminals,  
15       comprising:  
16       creating a package of targeted virtual objects;  
17       providing the package to one or more of the terminals;  
18       generating a retrieval plan;  
19       storing the retrieval plan at one or more of the terminals; and



1 providing a program to one or more of the terminals, the program including at least  
2 one virtual object location, wherein the retrieval plan designates virtual objects to be displayed  
3 during a display of the program.

4 26. The method of claim 25, further comprising:  
5 generating group assignment rules;  
6 storing the group assignment rules at one or more of the terminals; and  
7 creating group assignments by assigning one or more of the terminals to one or more  
8 groups based on the group assignment rules.

9 27. The method of claim 26, further comprising at one or more of the terminals receiving  
10 the program, retrieving one of the targeted virtual objects for display in the at least one virtual  
11 object location.

12 28. The method of claim 27, wherein the retrieval step, comprises:  
13 comparing the group assignments to the retrieval plan; and  
14 selecting a virtual object for display based on the comparison.

15 29. The method of claim 26, wherein one or more of at least one virtual object locations  
16 contains an interactive virtual object, further comprising:  
17 receiving a selection of the interactive virtual object; and  
18 linking a terminal selecting the interactive virtual object to an alternate  
19 program.

20 30. The method of claim 29, wherein the alternative program comprises an Internet web  
21 site.

1       31.     The method of claim 26, wherein the step of creating the group assignments comprises  
2     analyzing individual terminal data and terminal group data.

3       32.     The method of claim 31, wherein the individual terminal data comprises one or more  
4     of viewer demographic data, programs watched data, virtual objects viewed data, on-screen  
5     questionnaires, and characteristics imported from marketing databases, and wherein the  
6     terminal group data, comprises one or more of ADI, zip code, and geographical data.

7       33.     The method of claim 31, wherein one or more of the terminals comprises a global  
8     positioning satellite receiver, further comprising:  
9         determining a geographical location of one or more of the terminals; and  
10        storing the geographical location of the one or more of the terminals as individual  
11     terminal data.

12      34.     A method for assigning targeted virtual objects to virtual object locations in one or  
13     more programs, comprising:  
14         identifying the one or more programs to carry the targeted virtual objects;  
15         assigning the targeted virtual objects to target categories;  
16         ranking one or more of the programs based on the target categories and a first  
17     percentage of total viewers in one or more groups of viewers;  
18         ranking the targeted virtual objects based on a second percentage of total viewers in  
19     the one or more groups of viewers;  
20         determining, for one or more of the programs and one or more of the target  
21     categories, targeted virtual objects with overall highest rankings, based on the first and the  
22     second percentages;

1            assigning one or more targeted virtual objects as default virtual objects;  
2            assigning one or more targeted virtual objects as alternate virtual objects; and  
3            assigning the default virtual objects and the alternate virtual objects to the virtual object  
4 locations.

5        35.     The method of claim 34, wherein the first and second percentages of total  
6 viewers are based on viewer demographic information including zip code, ADI and  
7 geographical data.

8        36.     The method of claim 34, wherein assigning the default virtual objects and the alternate  
9 virtual objects, comprises:

10           dividing one or more target categories into groups;  
11           generating group assignment rules that are used to assign or more of the terminals to  
12 one or more of the groups;

13           storing the group assignment rules at one or more of the terminals, wherein processors  
14 at the one or more terminals assign the terminals to one or more groups using the group  
15 assignment rules;

16           generating a retrieval plan; and  
17           providing the retrieval plan to one or more of the terminals receiving the  
18 programs at the one or more terminals, comparing the group assignments to the retrieval  
19 plan.

20        37.     The method of claim 36, further comprising:  
21           revising the retrieval plan and the group assignment rules; and  
22           providing the revised retrieval plan and the revised group assignment rules to the one  
23 or more terminals.

1        38.        The method of claim 36, wherein the retrieval plan and the group assignment rules are  
2        provided over an Internet.

3        39.        The method of claim 34, wherein the package of targeted virtual objects is provided  
4        to a terminal over an Internet.

5        40.        The method of claim 34, wherein the package of targeted virtual objects is provided  
6        to a terminal using one of a public switched telephone network, a cable television network, a  
7        satellite television network, a local area network and a fiber optic network.

8  
9        41.        The method of claim 34, wherein virtual objects are provided with program content.

10       42.        The method of claim 34, wherein virtual objects are provided independently of  
11       program content.

12  
13       43.        A method for targeting virtual objects to subscribers in a television program delivery  
14       system, comprising:  
15               gathering information related to one or more of subscribers, wherein individual  
16       subscriber's information is gathered and stored at individual subscriber's terminals;  
17               analyzing the gathered information to determine a subscriber profile for one or more  
18       of the subscribers;  
19               correlating the subscriber profile with categories of virtual objects, wherein one or  
20       more virtual object categories includes at least one virtual object; and  
21               selecting from the correlated virtual object for display based on the correlation.

22       44.        The method of claim 43, wherein the individual subscriber's information includes  
23       virtual objects watched data.

1       45.     The method of claim 43, further comprising defining virtual object locations, wherein  
2       the virtual objects are displayed in the virtual object locations.

3       46.     The method of claim 45, wherein the virtual object locations are defined in a television  
4       program.

5       47.     The method of claim 45, wherein the virtual object locations are defined in an  
6       advertisement provided over a television delivery system.

7       48.     An apparatus that targets virtual objects for display at a viewer reception site,  
8       comprising:

9             a virtual object location identifier that identifies virtual object locations in a  
10       video;

11            a virtual object selector coupled to the virtual object location identifier that selects  
12       one or more virtual objects to display in one or more of the identified virtual object  
13       locations;

14            a targeted virtual object manager coupled to the virtual object selector, wherein the  
15       targeted virtual object manager determines virtual objects from the selected one or more virtual  
16       objects to be displayed in one or more of the virtual object locations; and

17            a group assignment rules generator that provides group assignment rules for classifying  
18       the reception site.

19       49.     The apparatus of claim 48, wherein the determined virtual objects are determined  
20       based on the group assignment rules and a personal profile of a viewer of the reception site,  
21       and wherein the personal profile is stored in a memory of the reception site.

1       50.     The apparatus of claim 49, wherein the personal profile is based on one or more of  
2       programs watched data, virtual objects viewed data and other viewer data collected and stored  
3       at the reception site.

4       51.     A routine, executable on a general purpose computer, for targeting virtual objects to  
5       an individual viewer, the routine, comprising:

6             a group definition routine that defines groups based on common viewer characteristics;

7             a group assignment routine that assigns individual viewer terminals to one or more of  
8       the groups;

9             a virtual object location routine that determines available virtual object locations in a  
10       program; and

11            a retrieval plan generator that generates a plan for retrieving one or more virtual  
12       objects for display in one or more of the available virtual object locations, wherein the retrieval  
13       plan is generated based on the group definitions.

14       52.     A method for targeting virtual objects to viewers, comprising:

15             recognizing a virtual object location in a program;

16             receiving one or more virtual objects; and

17             generating a retrieval plan that directs viewers' terminals to insert one or more of the  
18       virtual objects into one or more of the virtual object locations.

19       53.     A method for targeting virtual objects to locations in a program, comprising:

20             at a local viewer terminal, identifying virtual objects for insertion into one or  
21       more of the locations;

22             generating an individual viewer profile; and

1           providing one or more of the identified virtual objects for insertion based on the  
2           individual viewer profile.

3       54.     A method for targeting virtual objects to terminals, comprising:  
4           identifying the terminals based on characteristics of individual terminals;  
5           identifying virtual object locations in programs for display at the terminals; and  
6           targeting the virtual objects for insertion into the virtual object locations based  
7           on the identities of the terminals.

8       55.     The method of claim 54, further comprising displaying multiple virtual objects  
9           simultaneously

10      56.     The method of claim 54, wherein one or more of the virtual objects are interactive  
11      virtual objects, further comprising:  
12           receiving a selection of one or more of the interactive virtual objects from one or more  
13      of the terminals;  
14           linking the selecting terminal to a remote location; and  
15           displaying content from the remote location at the selecting terminal.

16      57.     The method of claim 56, wherein the remote location is an operations center and the  
17      content is an additional program.

18      58.     The method of claim 56, wherein the remote location is an Internet web site and the  
19      content is one or more web pages.

1        59.        A terminal in a television program delivery system that targets virtual objects for  
2 display to a viewer of the terminal, comprising:

3                a receiver that receives programs containing virtual object locations, virtual objects,  
4 and a virtual object retrieval plan;

5                a memory that stores the virtual object retrieval plan; and

6                a processor that executes a group assignment routine to assign the terminal to one or  
7 more groups, wherein the groups are defined based on common viewer characteristics, and  
8 executes a virtual object assignment routine that assigns virtual objects to the virtual object  
9 locations based on a comparison of the retrieval plan and the group assignments.

10        60.        The terminal of claim 59, wherein the group assignment rules include an initial set of  
11 group assignment rules stored in the memory.

12        61.        The terminal of claim 59, wherein the receiver receives and the memory stores group  
13 assignment rules, and wherein the processor uses the group assignment rules and data related  
14 to the terminal to execute the group assignment routine.

15        62.        The terminal of claim 61, wherein the data related to the terminal is stored in the  
16 memory, the data related to the terminal including internal information generated internally at  
17 the terminal and external information generated external to the terminal and provided to the  
18 terminal.

19        63.        The terminal of claim 62, wherein the terminal further comprises a global positioning  
20 satellite (GPS) receiver, the GPS receiver determining a location of the terminal, wherein the  
21 location is stored in the memory as internal information, and wherein the processor uses the  
22 location to determine area of dominant influence and postal code information.



1       64.     The terminal of claim 62, wherein the internal information includes programs watched  
2       information and virtual objects viewed information for programs and virtual objects displayed  
3       at the terminal.

4       65.     The terminal of claim 61, wherein the group assignment rules are periodically revised,  
5       the memory storing the revised group assignment rules and the processor determining revised  
6       group assignments based on the revised group assignment rules.

7       66.     The terminal of claim 61, wherein the data related to the terminal is revised, the  
8       processor determining revised group assignments based on the revised data related to the  
9       terminal.

10      67.     The terminal of claim 61, wherein the processor uses the group assignment  
11      rules to derive terminal identifying information based on other information stored at the  
12      terminal.

13      68.     A method for assigning targeted virtual objects to virtual object locations in one or  
14      more programs, comprising:

15             identifying the one or more programs to carry the targeted virtual objects;  
16             assigning the targeted virtual objects to target categories and to groups within the  
17      target categories;

18             generating virtual object location group percentage breakdowns, wherein the  
19      generating step comprises using generic viewing population information to assign the groups to  
20      the one or more programs;

21             creating virtual object ranking percentages based on the generic viewing population  
22      information;

1 determining, for one or more of the programs and one or more of the target  
2 categories, targeted virtual objects with overall highest ranking percentages and group  
3 percentage breakdowns; and

4 assigning virtual objects to the virtual object locations based on the determined ranking  
5 percentages and group percentage breakdowns.

6 69. A method of targeting virtual objects to terminals, comprising:  
7 identifying virtual objects;  
8 providing the one or more of the virtual objects to one or more of the terminals;  
9 generating a retrieval plan;  
10 storing the retrieval plan at one or more of the terminals; and  
11 providing a program to one or more of the terminals, the program including at least  
12 one virtual object location, wherein the retrieval plan designates virtual objects to be displayed  
13 during a display of the program.

14 70. The method of claim 69, further comprising:  
15 generating group assignment rules;  
16 storing the group assignment rules at one or more of the terminals; and  
17 creating group assignments by assigning one or more of the terminals to one or more  
18 groups based on the group assignment rules.

19 71. The method of claim 70, wherein the step of generating group assignment rules  
20 comprises generating initial group assignment rules, and wherein the step of storing the group  
21 assignment rules comprises storing the initial group assignment rules.

1       72.     The method of claim 71, wherein the initial group assignment rules are stored at or  
2       before an initial use of a terminal.

3       73.     The method of claim 70, further comprising at one or more of the terminals receiving  
4       the program, retrieving one of the targeted virtual objects for display in the at least one virtual  
5       object location.

6       74.     The method of claim 73, wherein the retrieval step, comprises:  
7             comparing the group assignments to the retrieval plan; and  
8             selecting a virtual object for display based on the comparison.

9       75.     The method of claim 70, wherein one or more of at least one virtual object locations  
10       contains an interactive virtual object, further comprising:  
11             receiving a selection of the interactive virtual object; and  
12             linking a terminal selecting the interactive virtual object to an alternate  
13       program.

14       76.     The method of claim 70, wherein the group assignment rules are provided to a terminal  
15       using one of a public switched telephone network, a cable television network, a satellite  
16       television network, a local area network, a fiber optic network and an Internet.

17       77.     The method of claim 69, wherein the virtual objects are provided to a terminal using  
18       one of a public switched telephone network, a cable television network, a satellite television  
19       network, a local area network, a fiber optic network and an Internet.

1        78.        The method of claim 69, wherein the retrieval plan is provided to a terminal using one  
2        of a public switched telephone network, a cable television network, a satellite television  
3        network, a local area network, a fiber optic network and an Internet.

**ABSTRACT**

A method and an apparatus are used to target virtual objects to subscribers in a television delivery system. Programs are selected and virtual object locations are defined in the selected programs. The virtual objects available for targeting are categorized and the categories are correlated to viewing population information to determine the optimum targeting of the virtual objects. The virtual objects may be targeted based on information related to groups of subscribers. When a frame of a program includes a virtual object location, a default or an alternate virtual object is displayed. The virtual object location may change over space or time. The virtual object may be interactive, and may be used to link a subscriber to a remote location, such as an Internet web site. An operations center or a cable headend may generate group assignment rules that are stored in individual terminals and are used to assign the subscribers' television terminals to groups, based on factors such as area of dominant influence and household income maintained securely and privately within the terminal. A retrieval plan is then generated that instructs the television terminals to select the desired virtual object for display. The television terminals record which virtual objects were displayed, and may use this information to assist in targeting the virtual object.



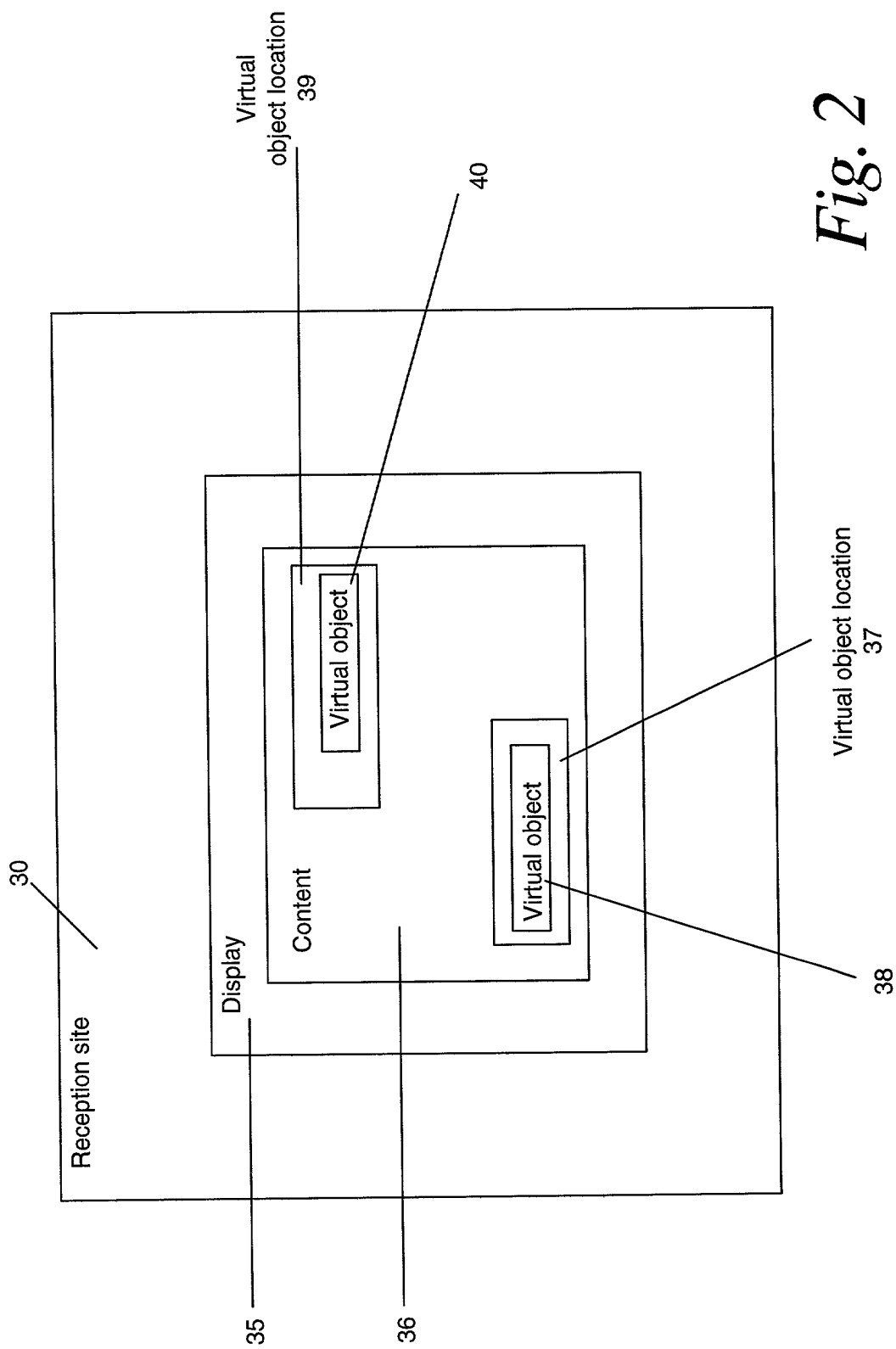


Fig. 2

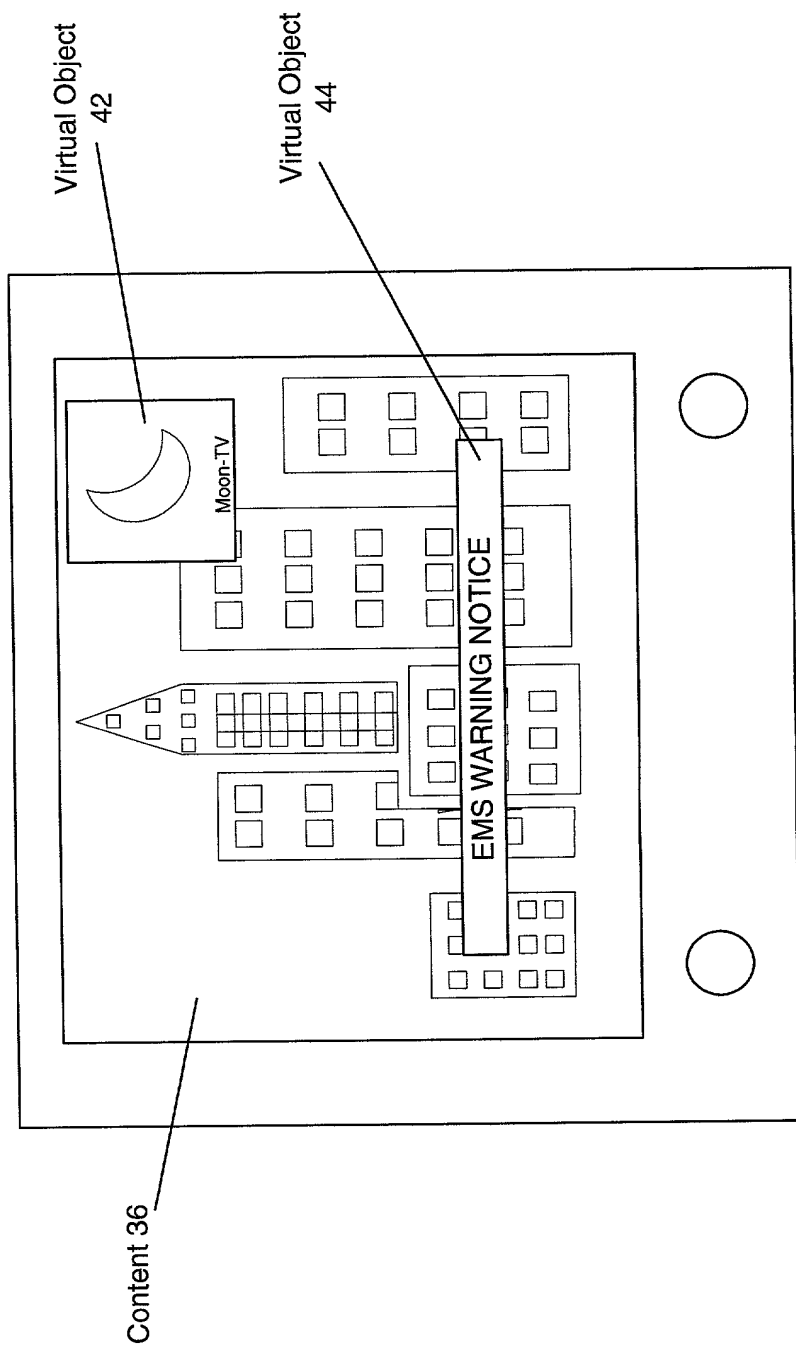


Fig. 3



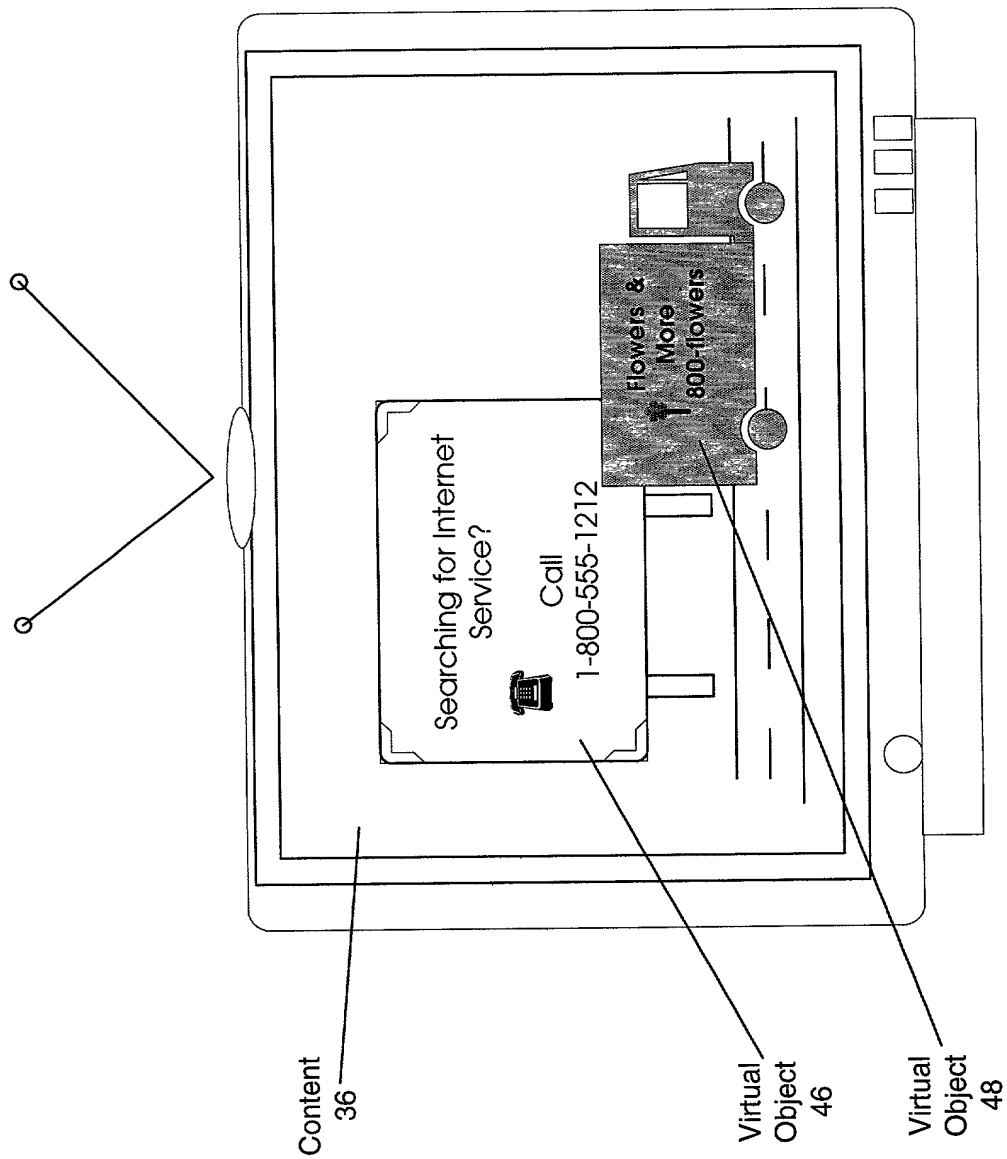
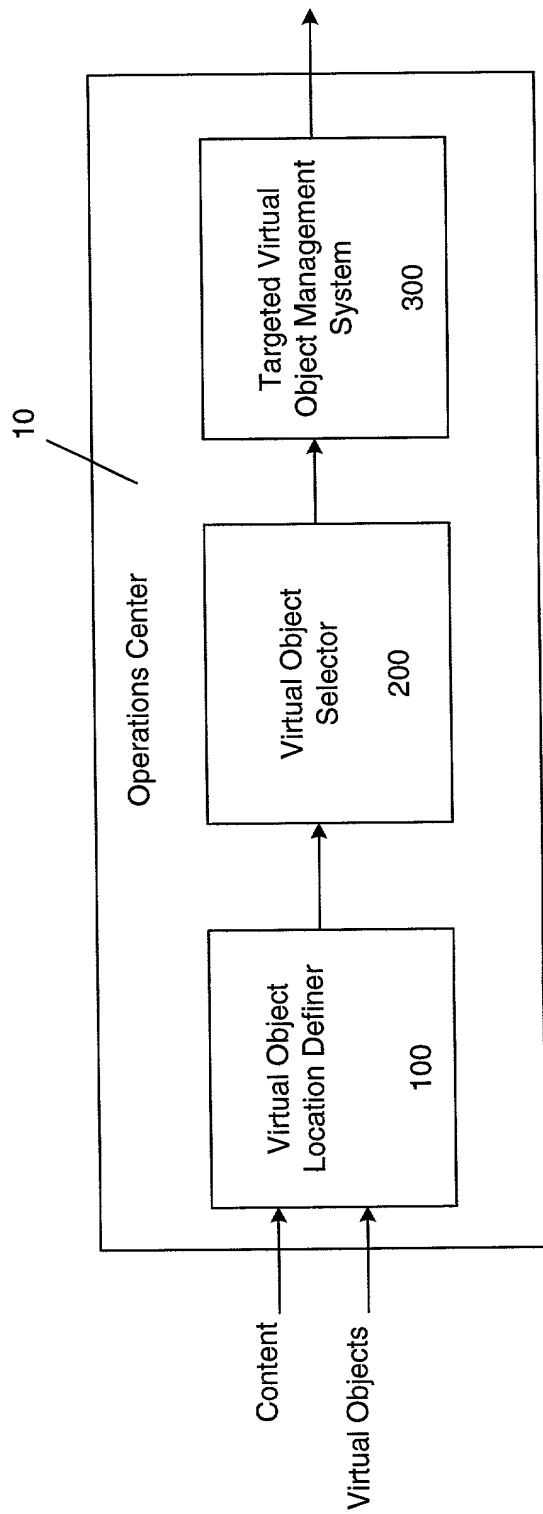
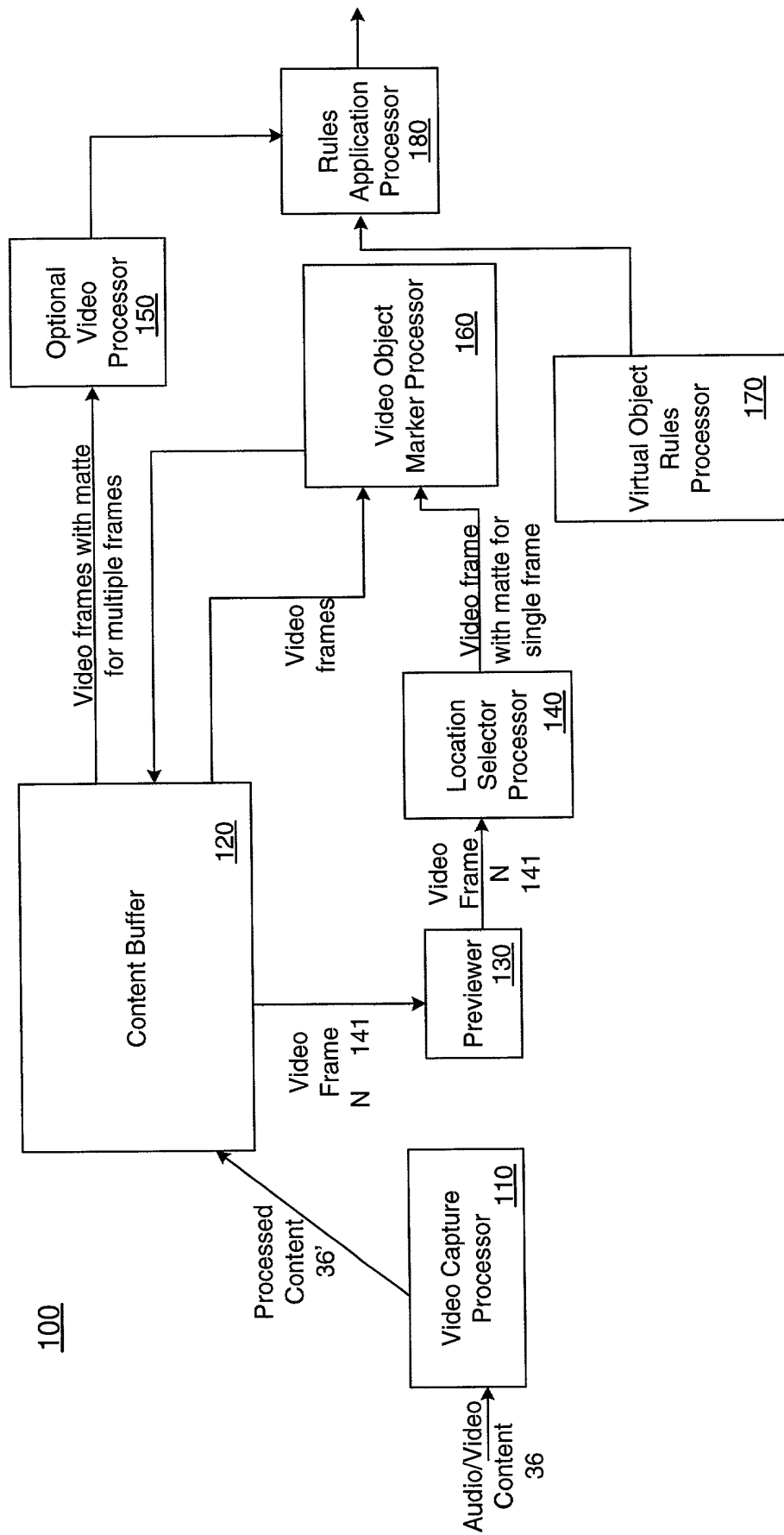


Fig. 4



**Fig. 5**



*Fig. 6*

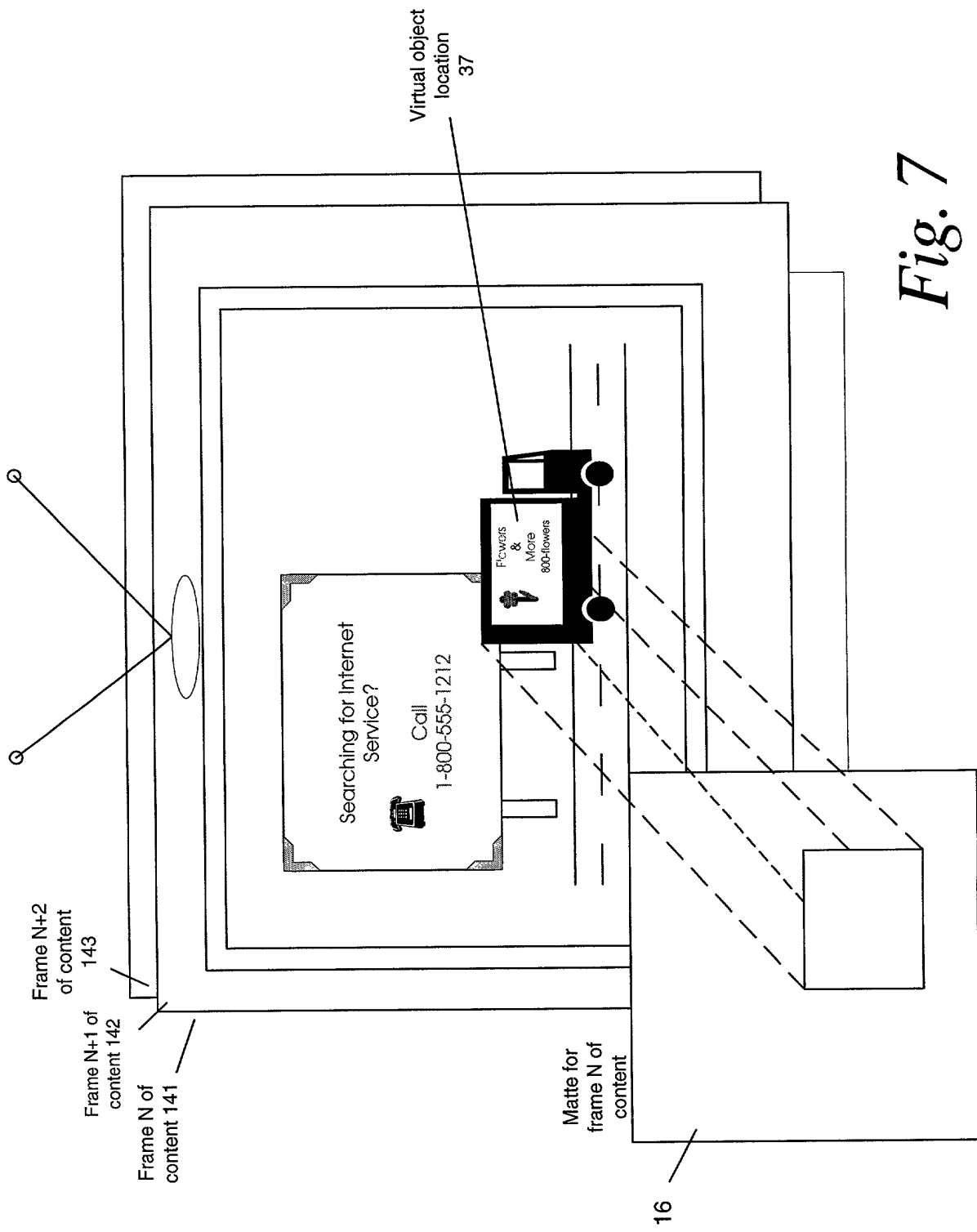


Fig. 7

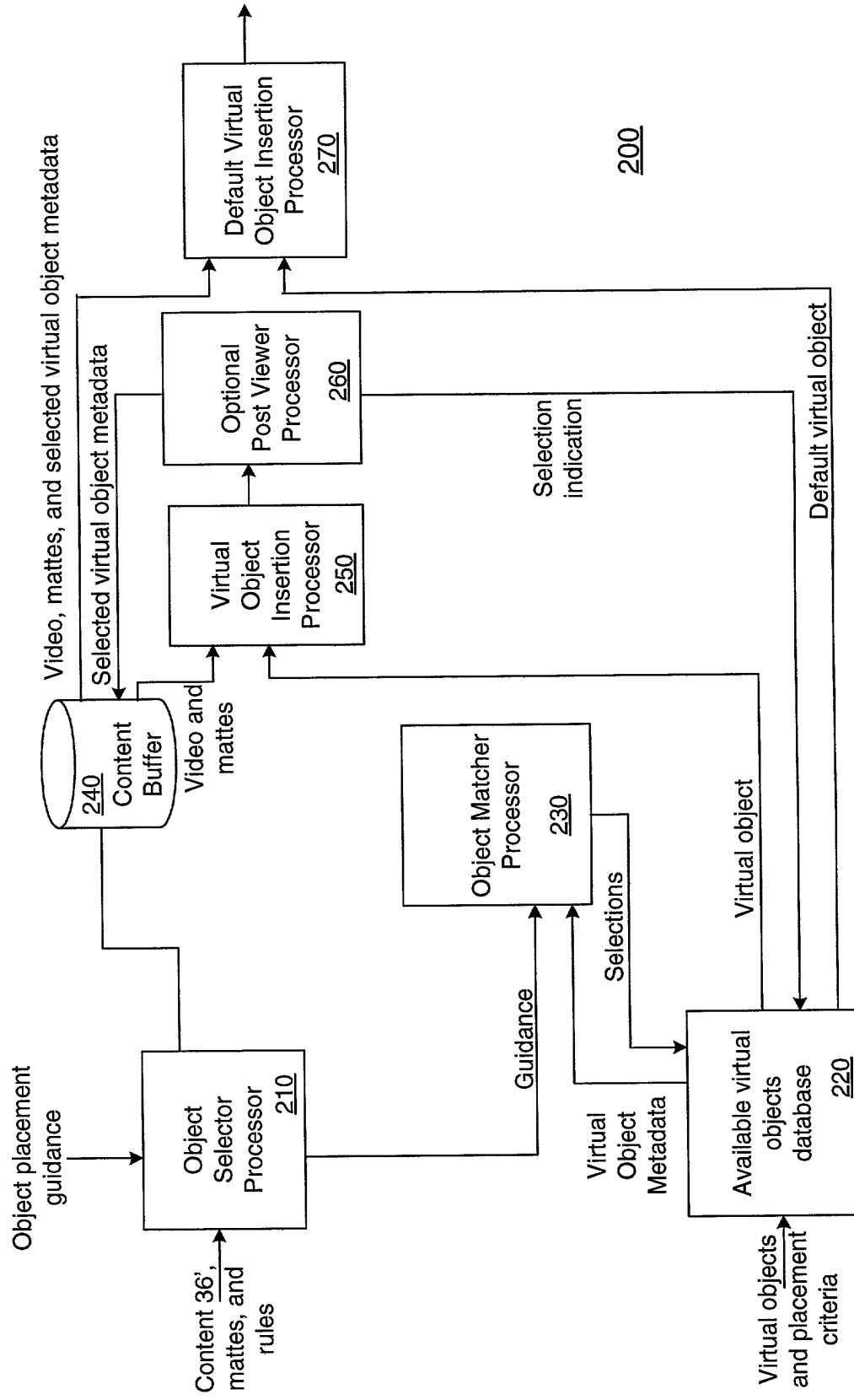


Fig. 8

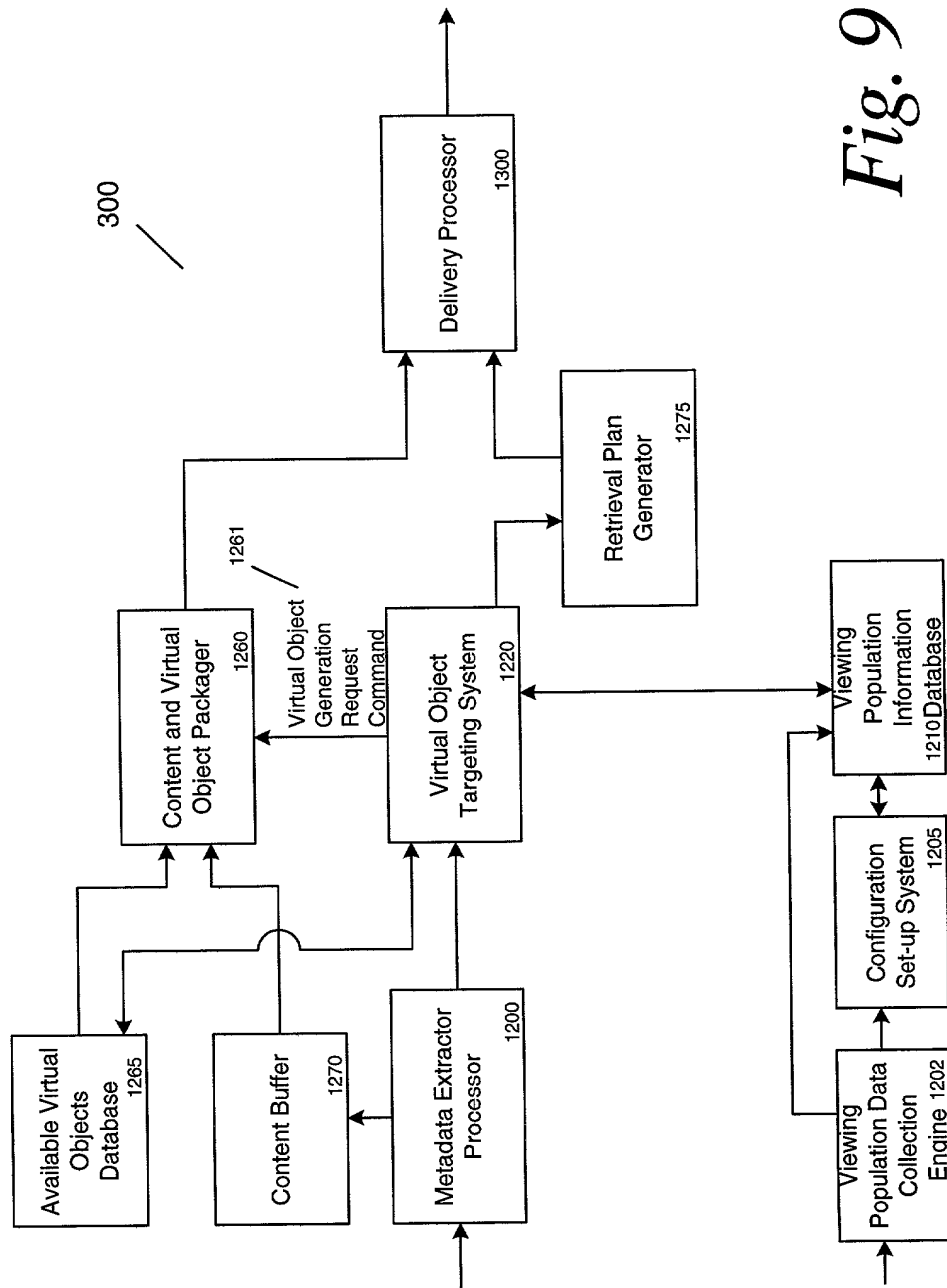
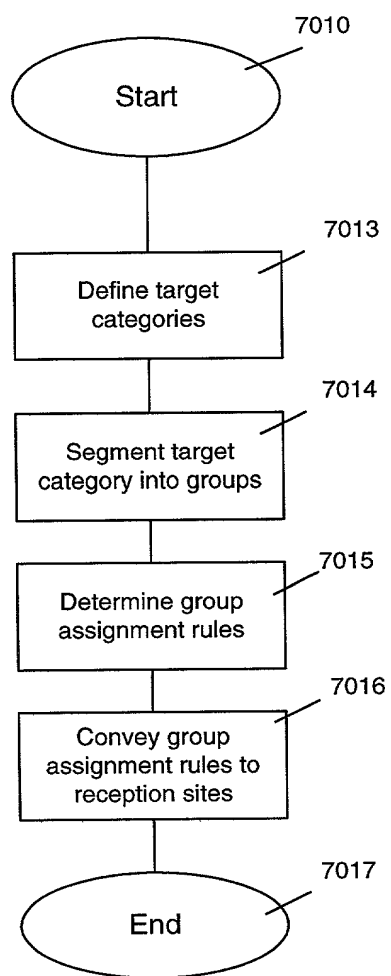
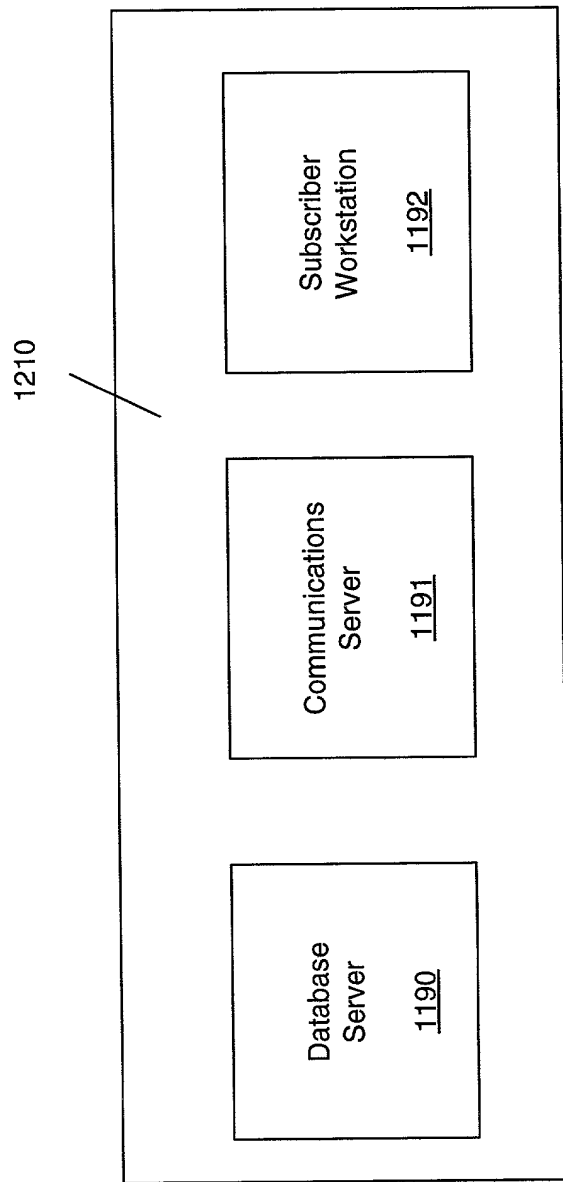


Fig. 9





*Fig. 11*



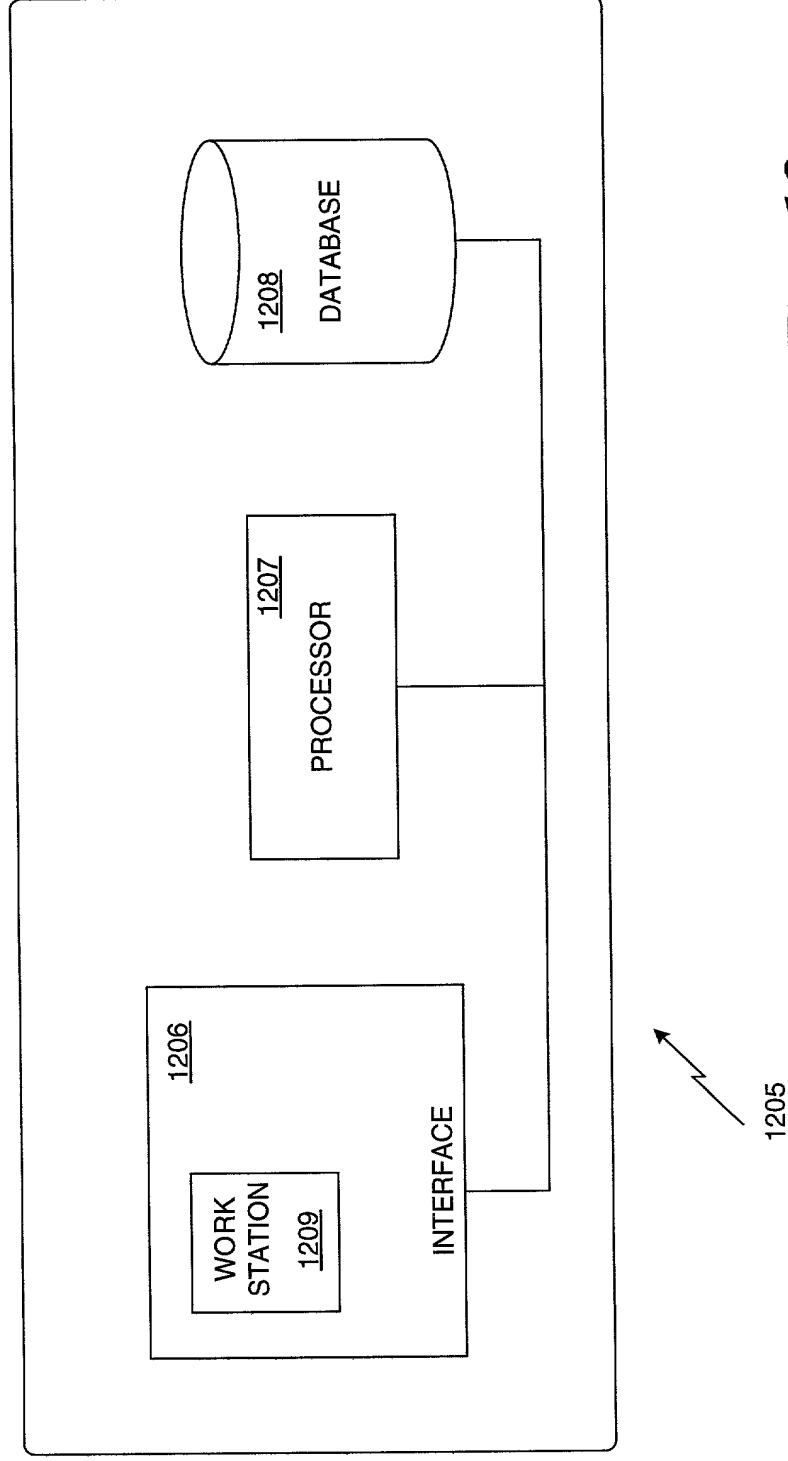
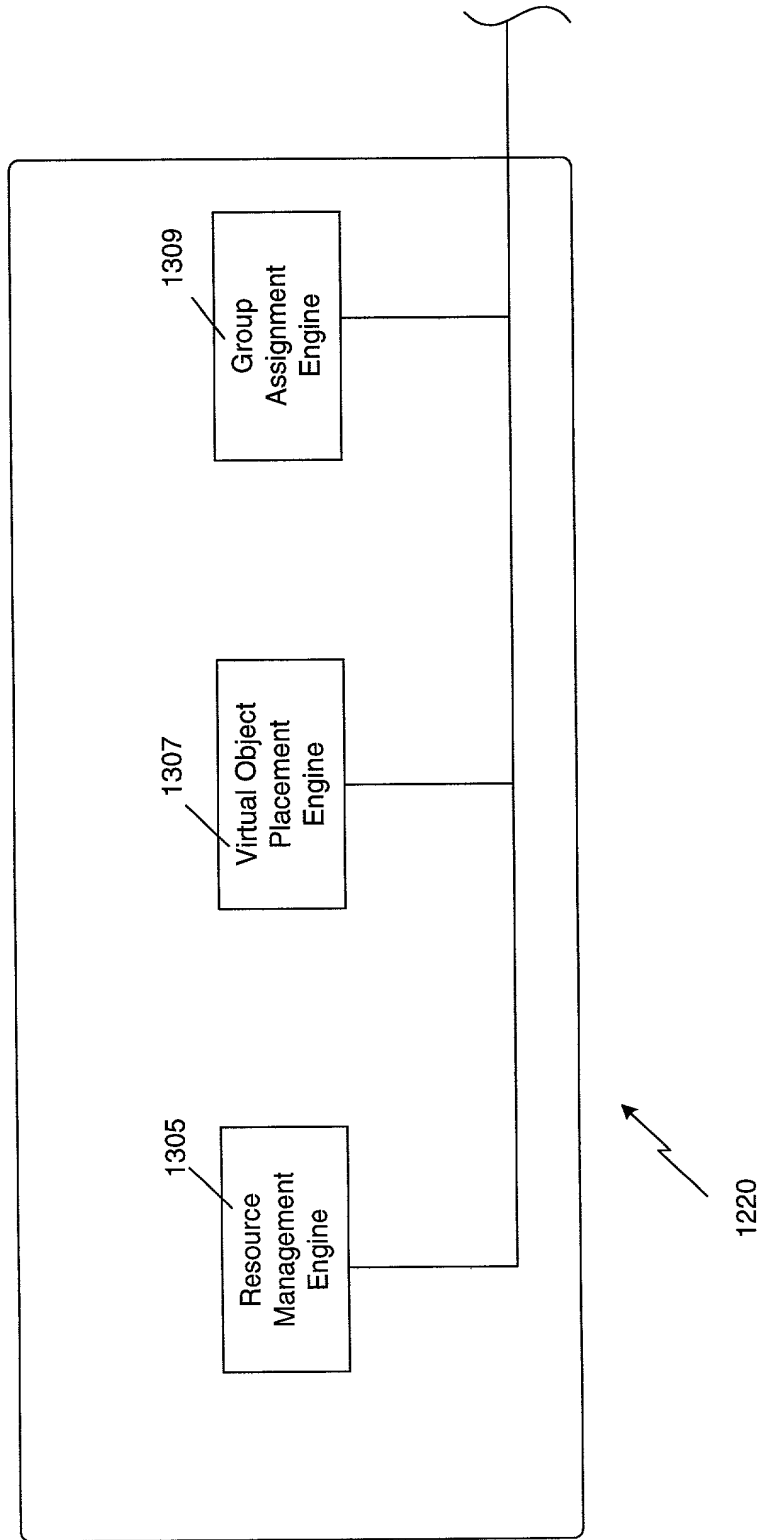
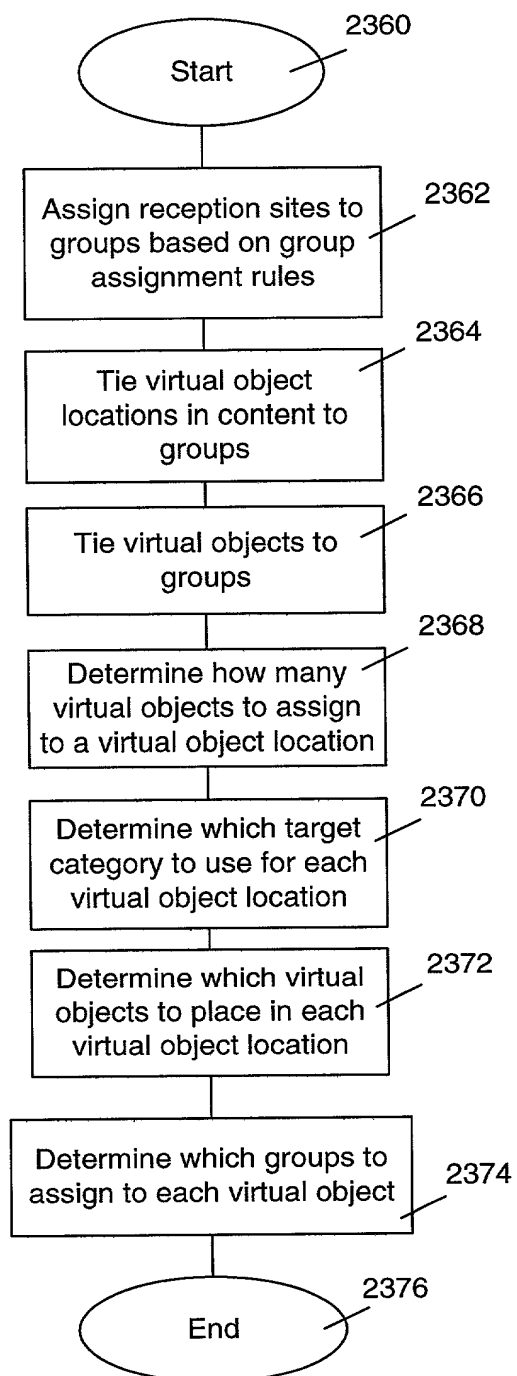


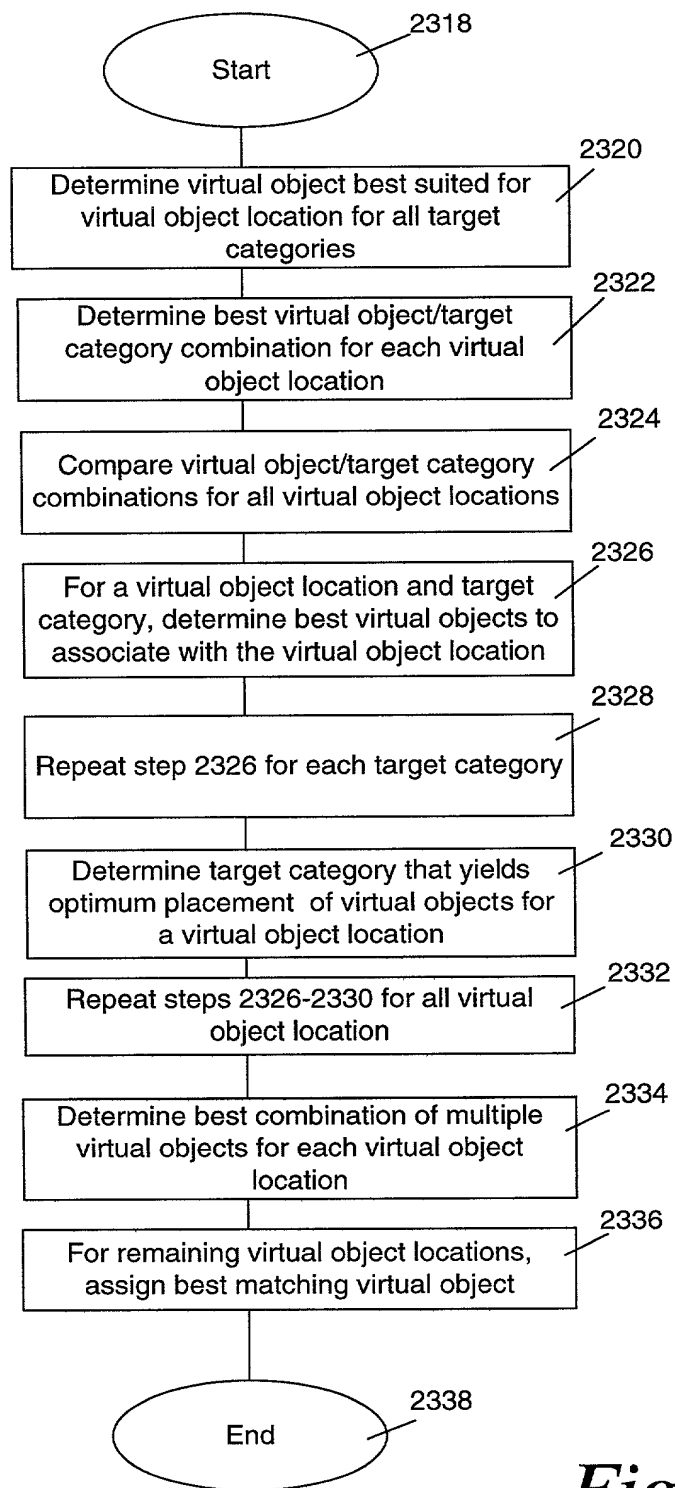
Fig. 12



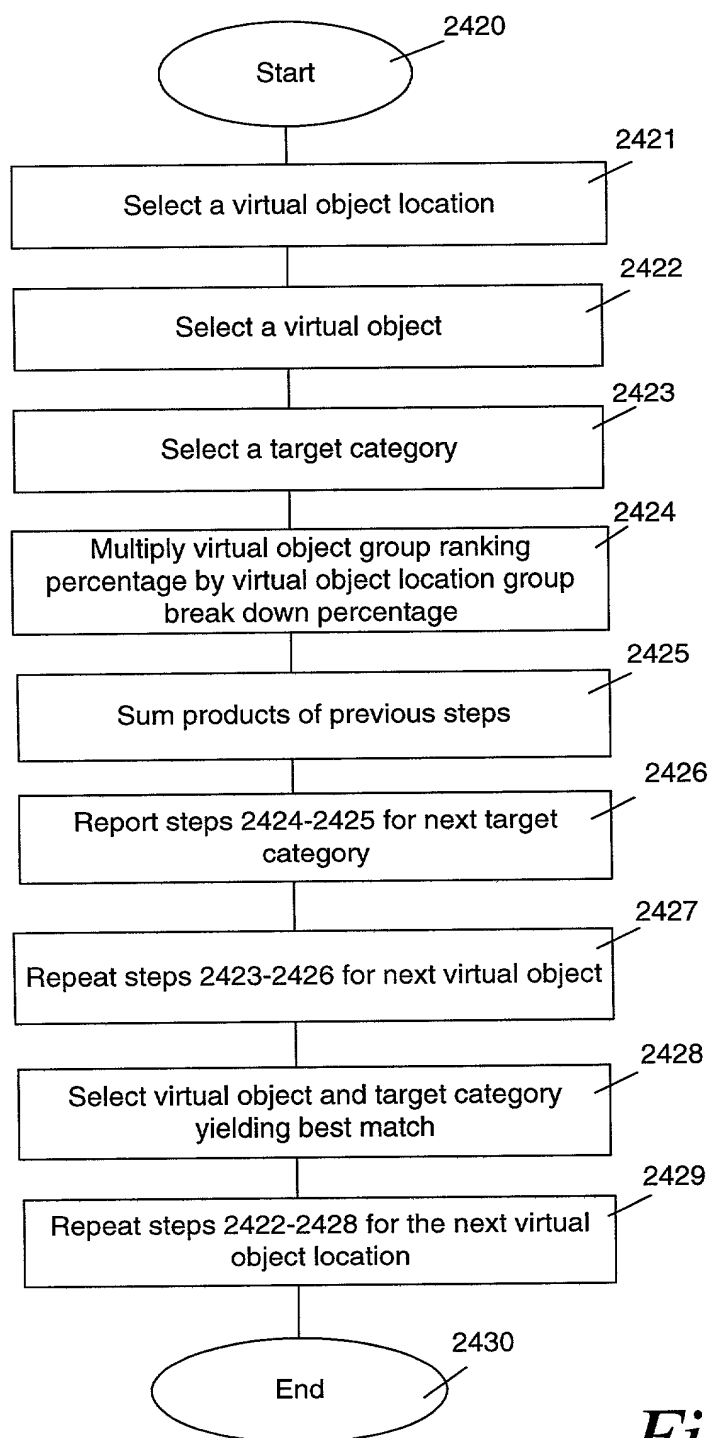
*Fig. 13*



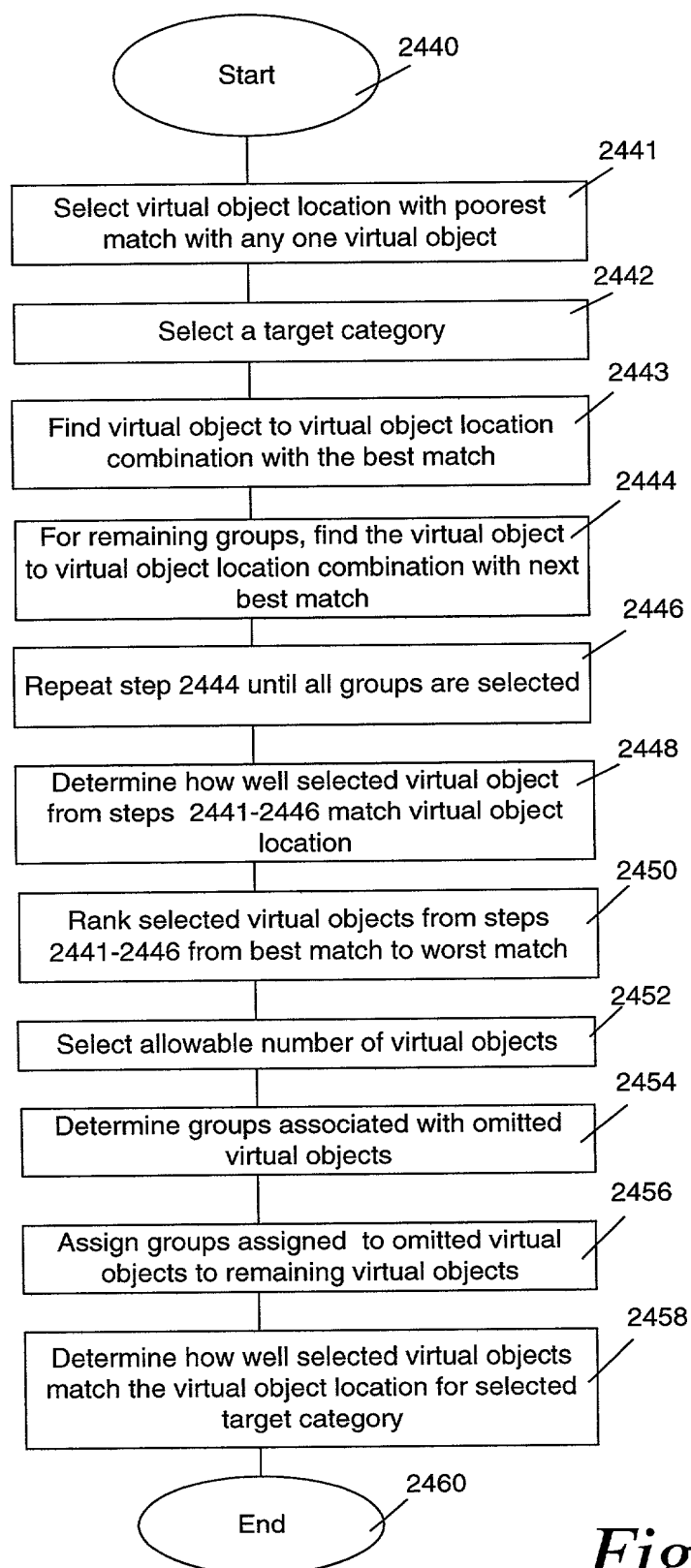
*Fig. 14*



*Fig. 15*



*Fig. 16*



*Fig. 17*

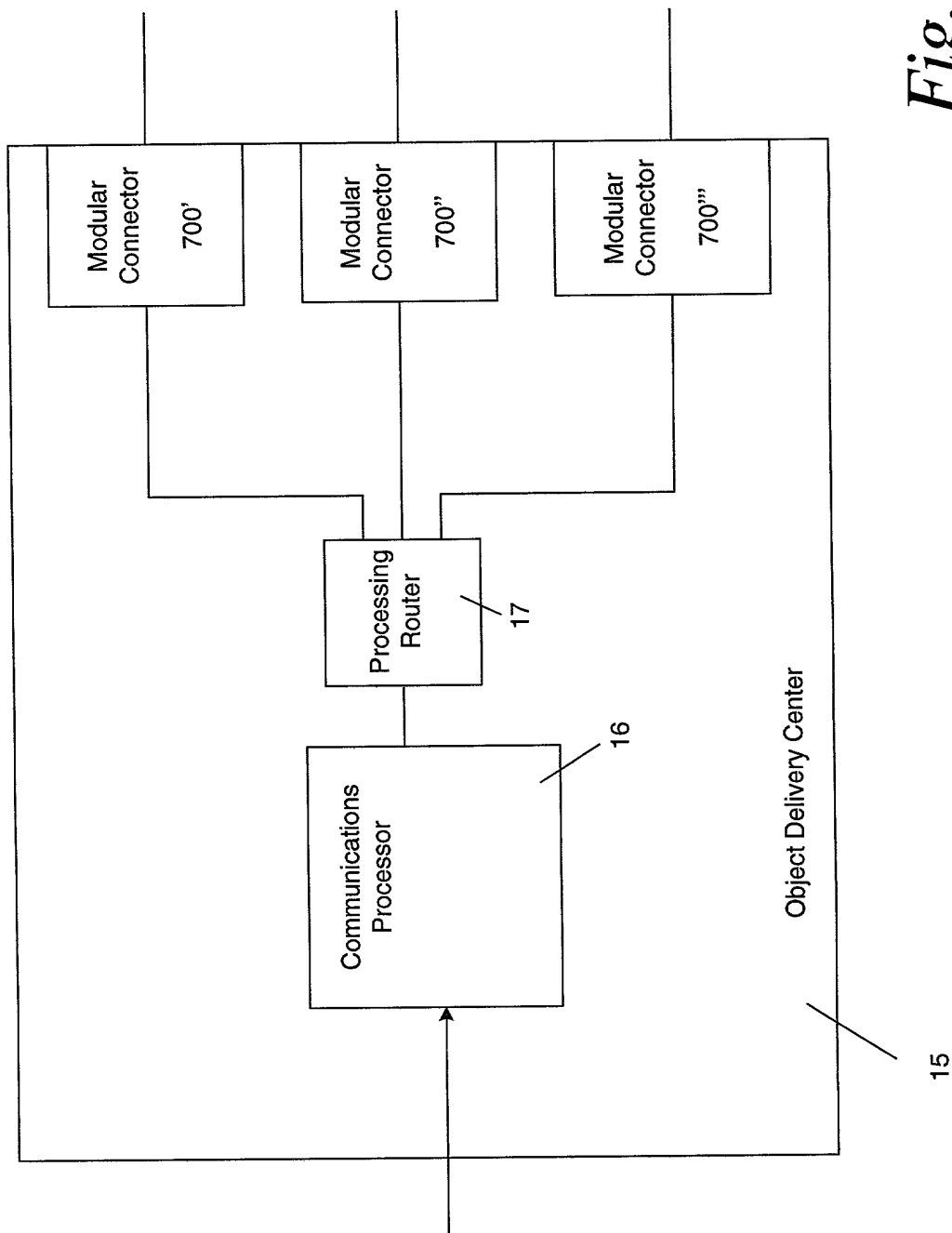


Fig. 18

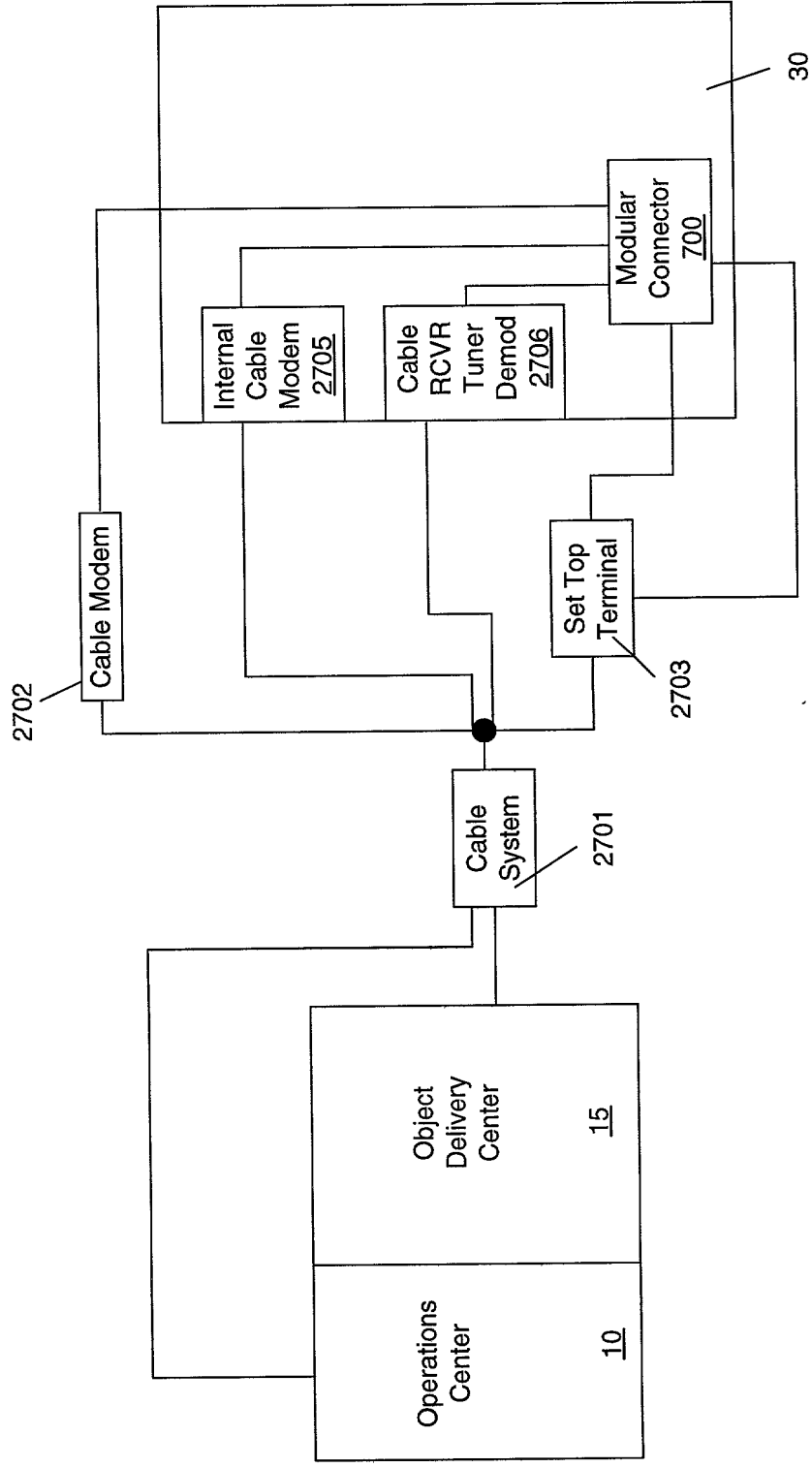


Fig. 19



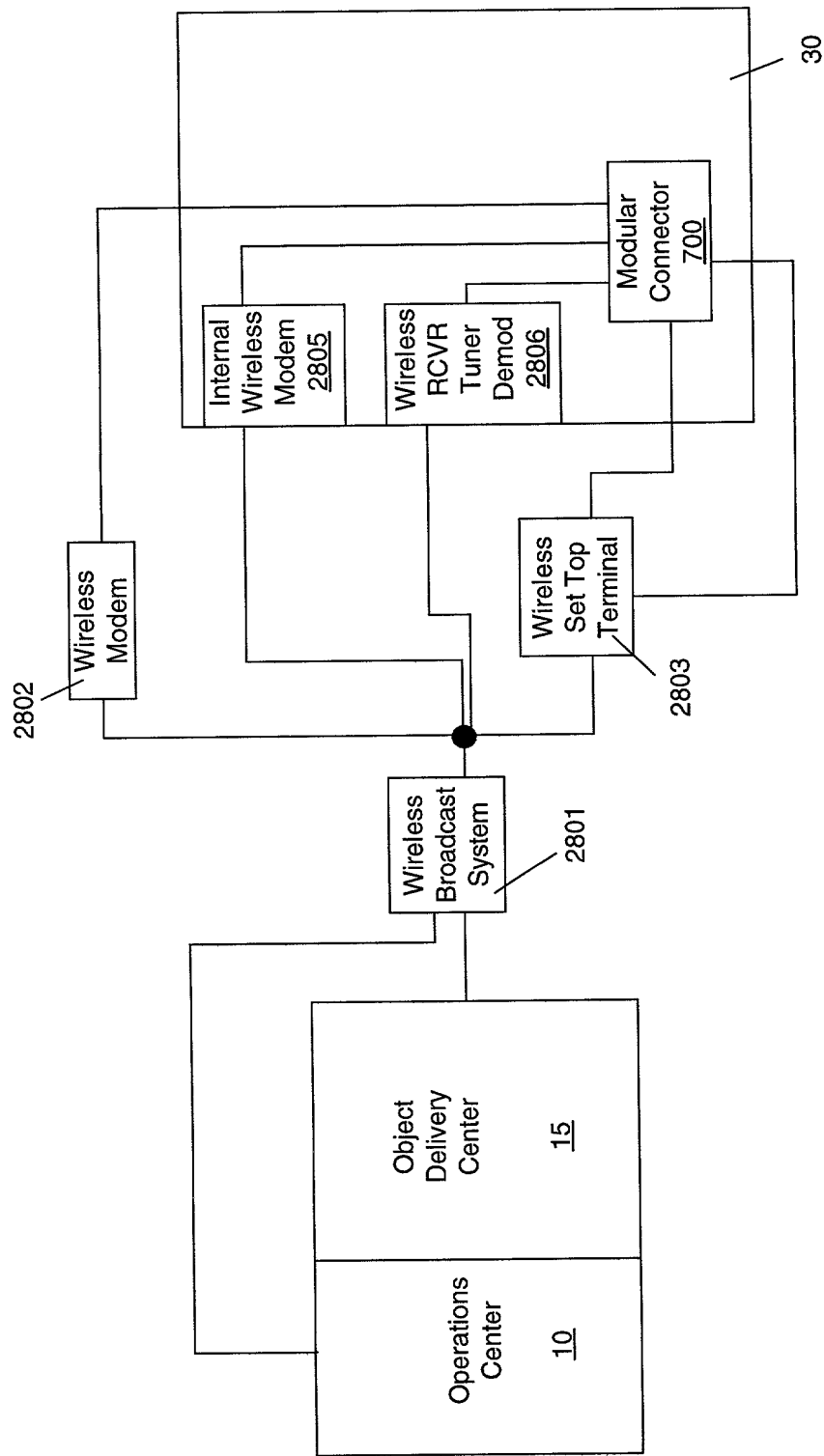


Fig. 20

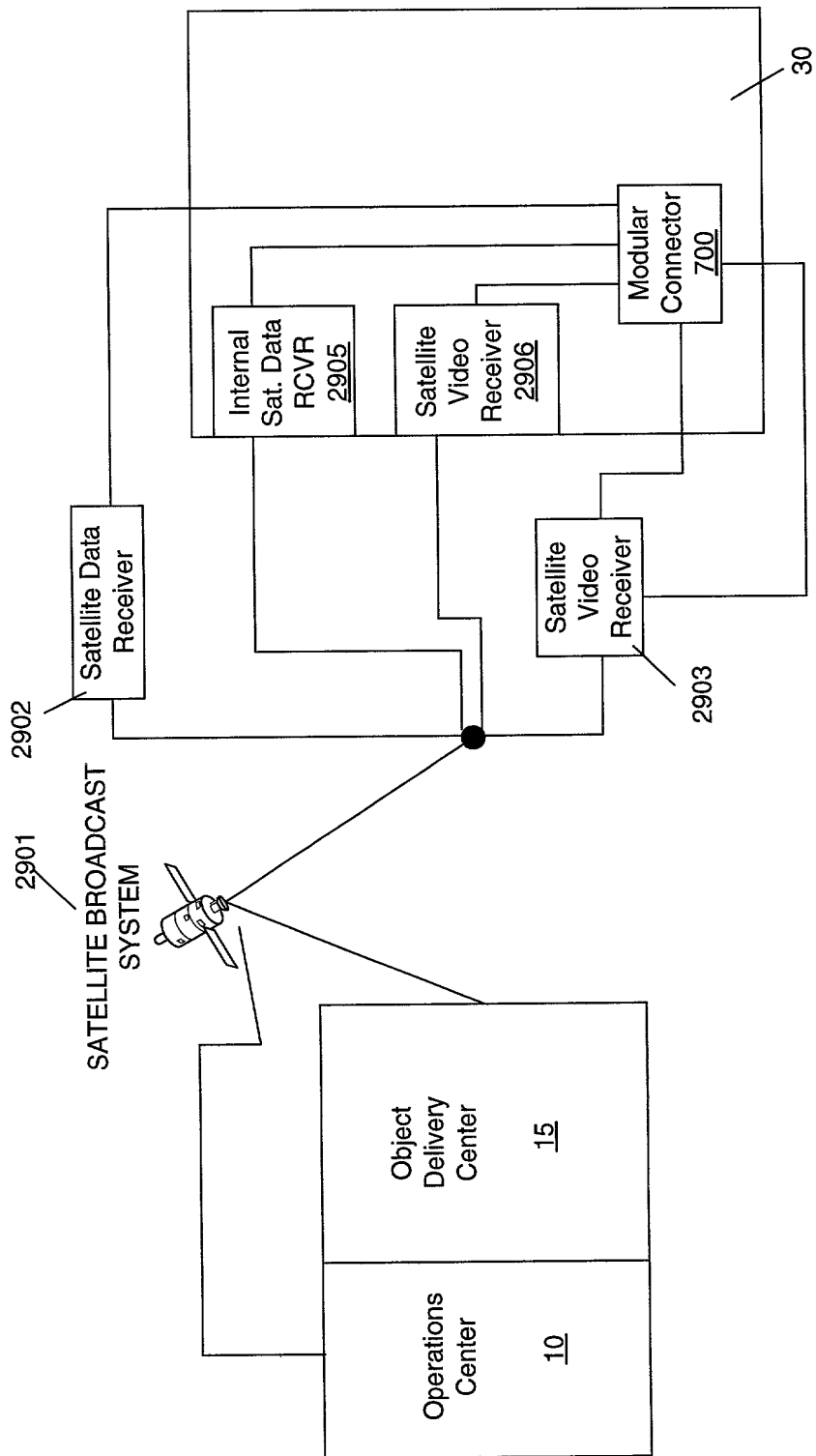
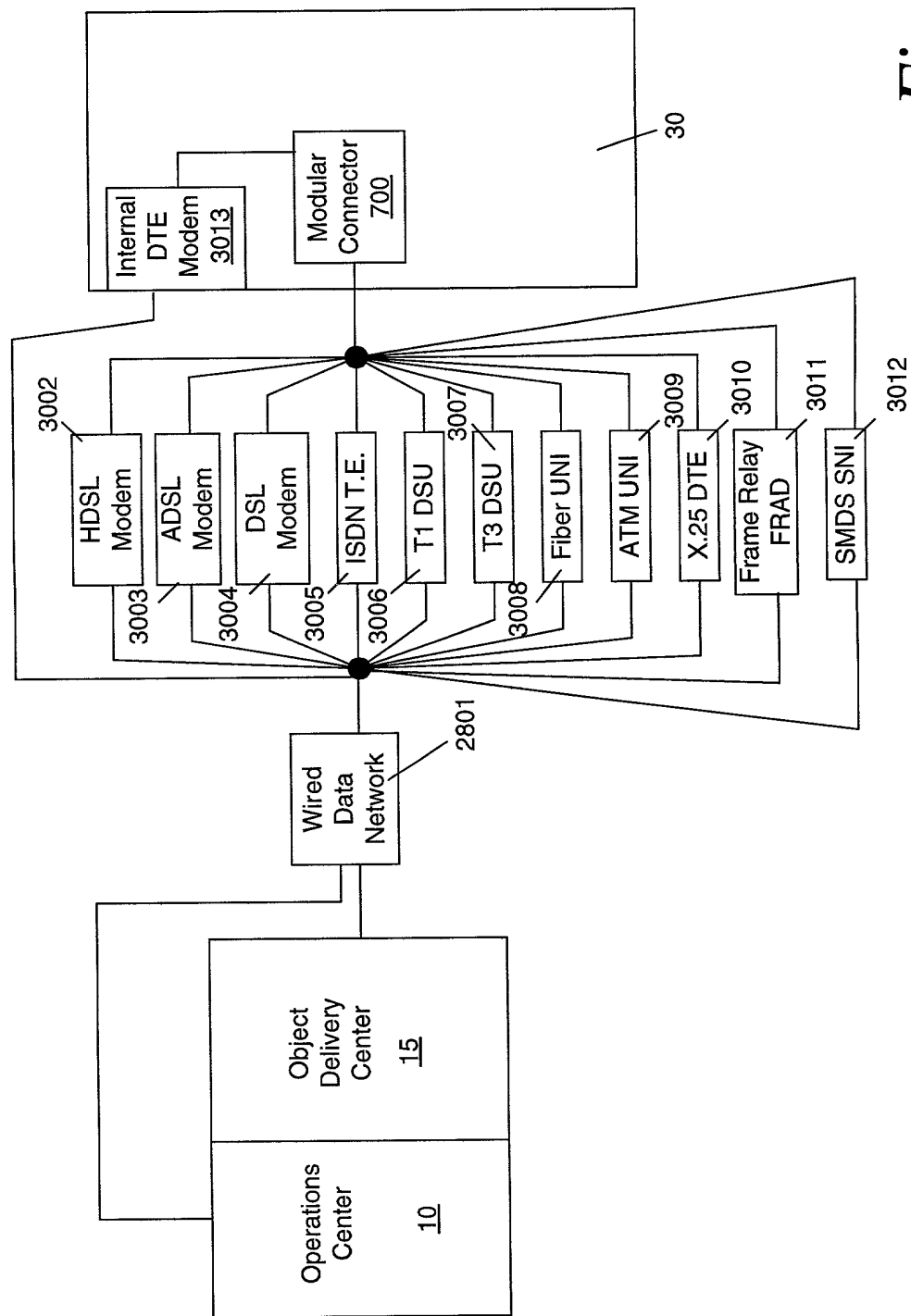


Fig. 21



*Fig. 22*

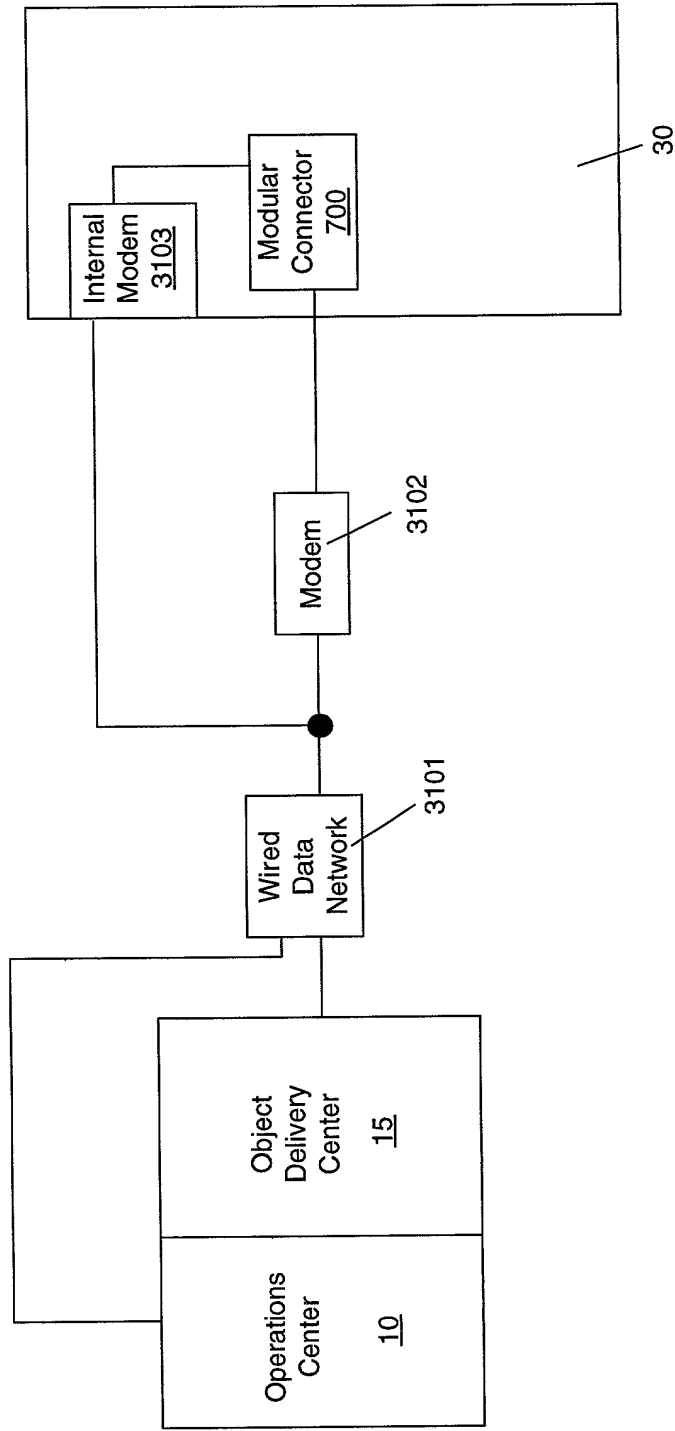
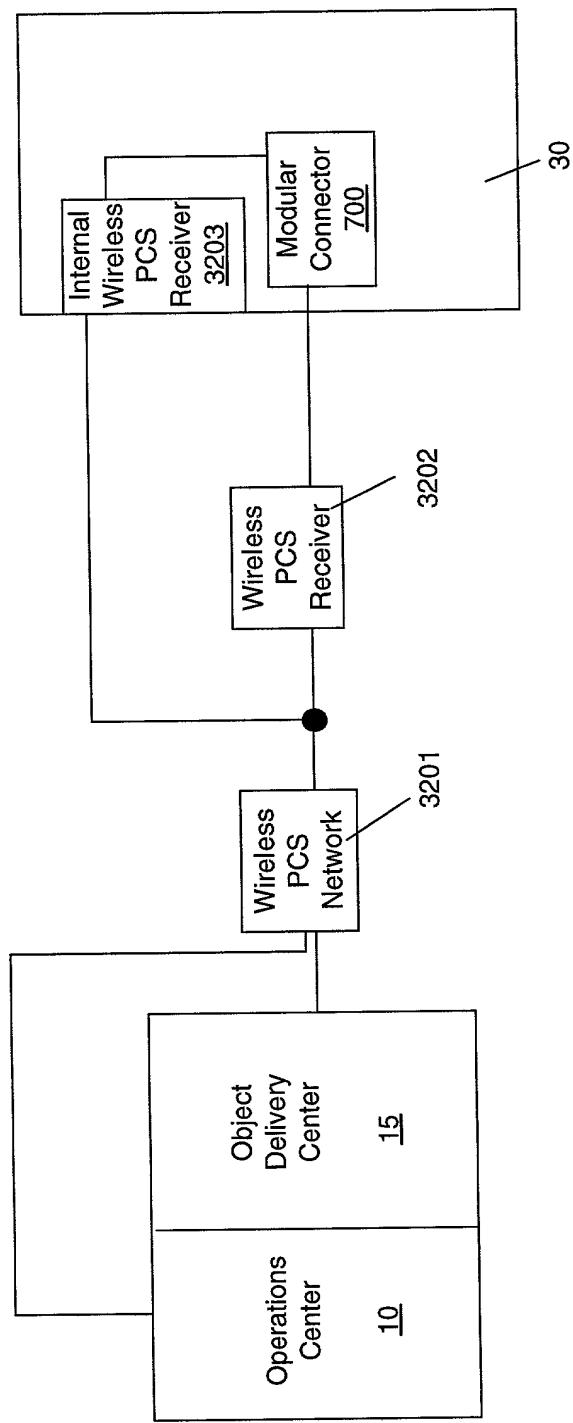


Fig. 23



**Fig. 24**

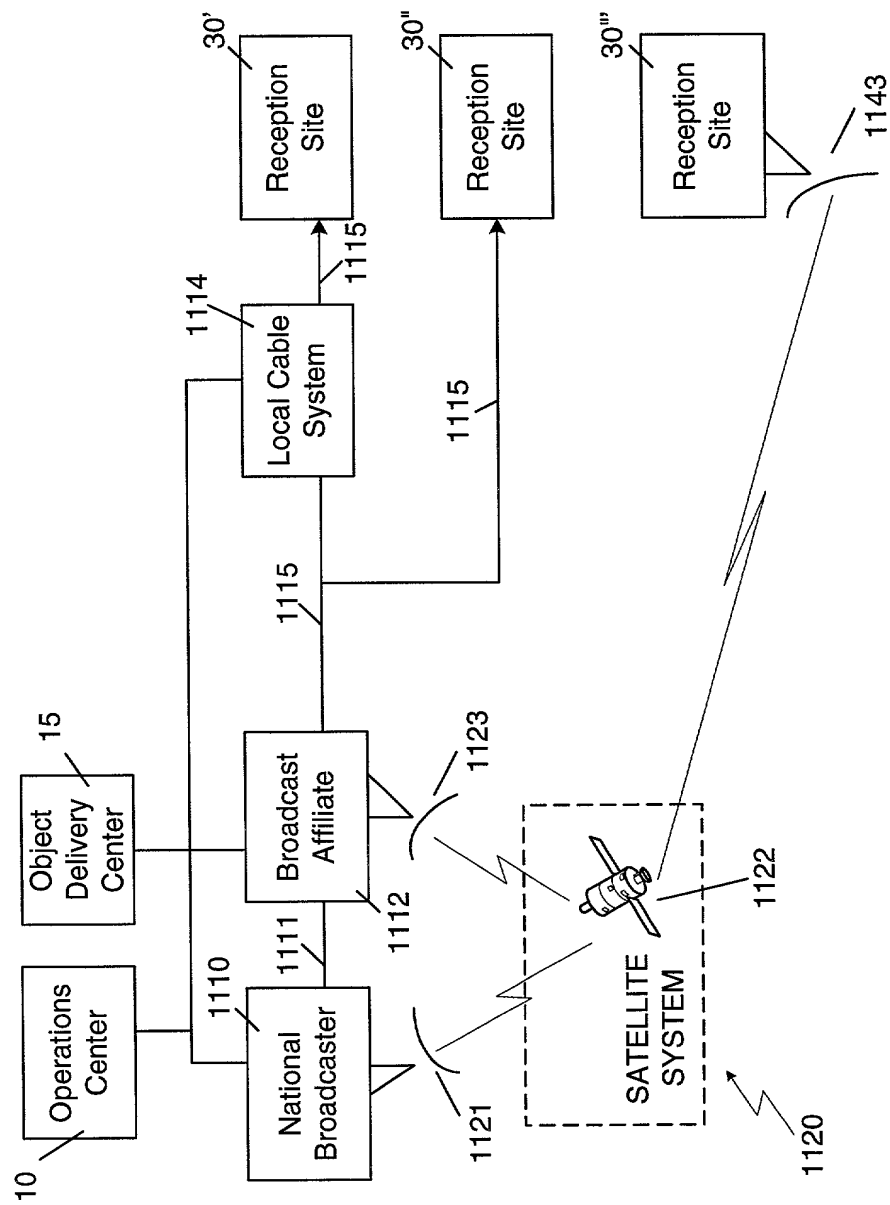


Fig. 25

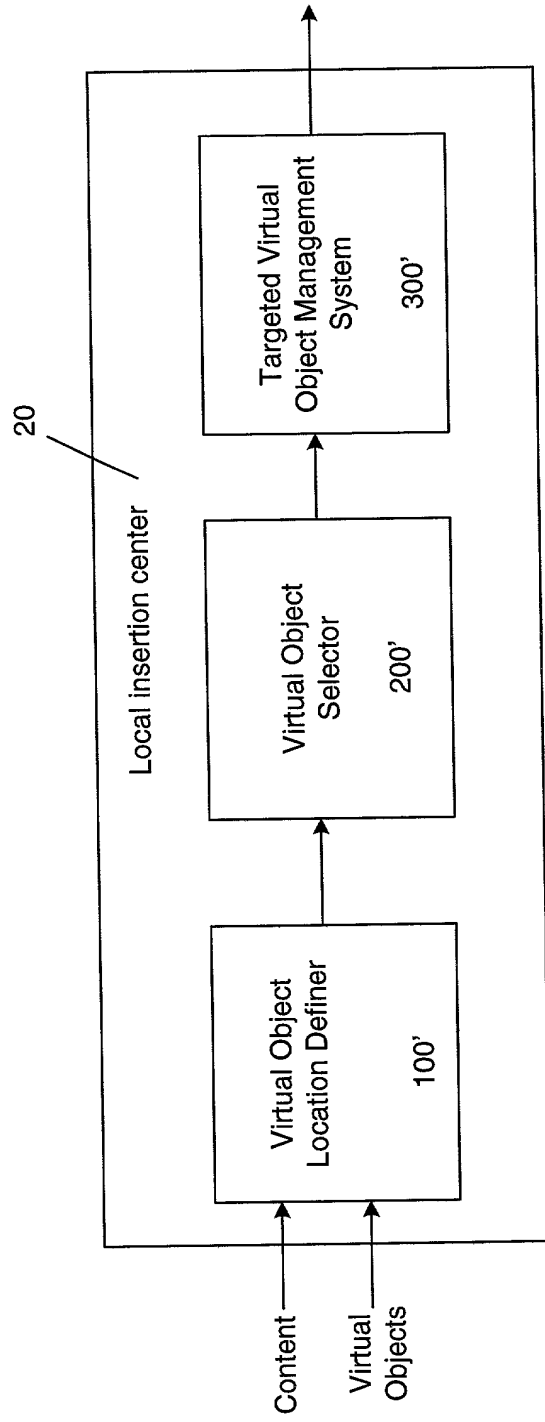


Fig. 26





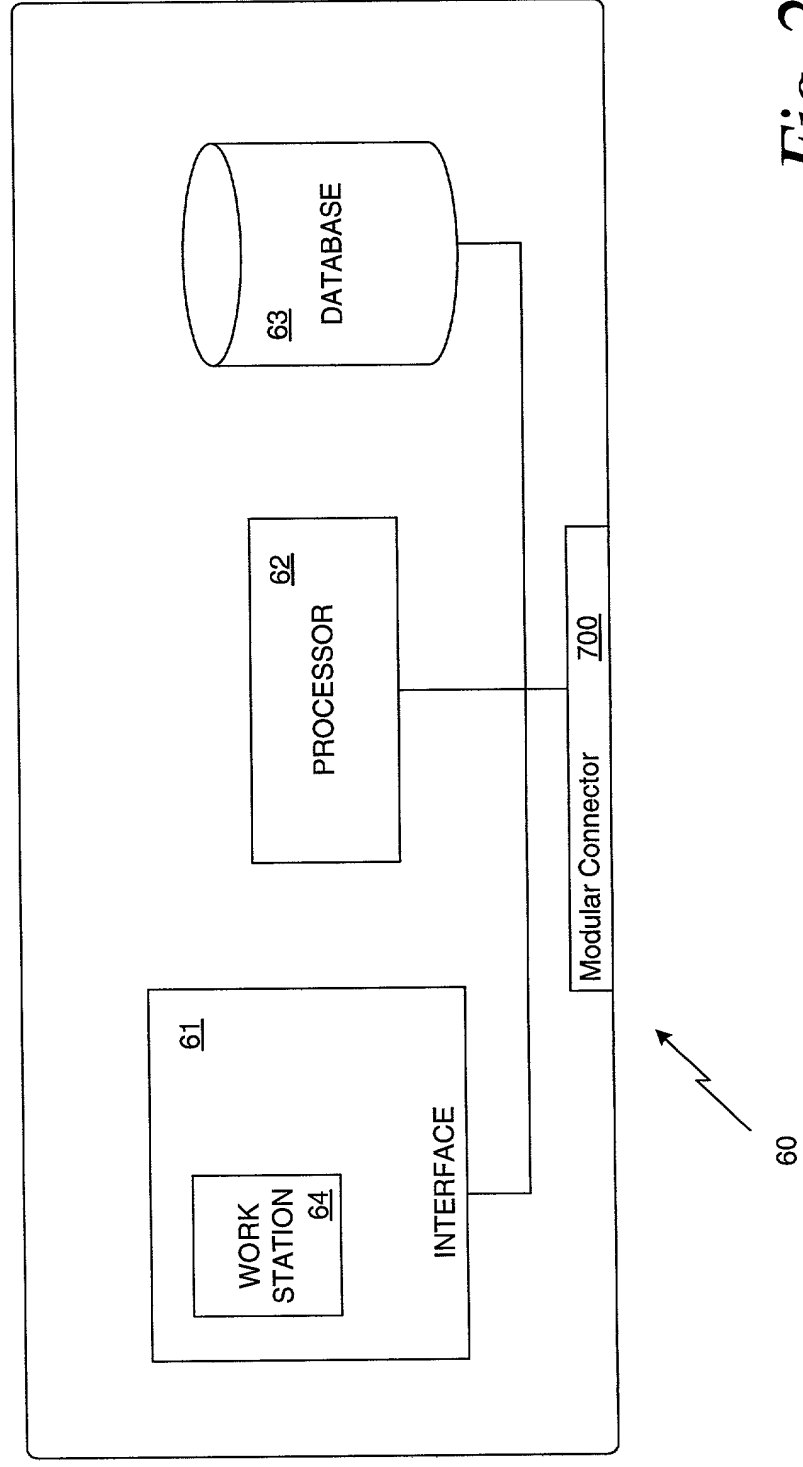
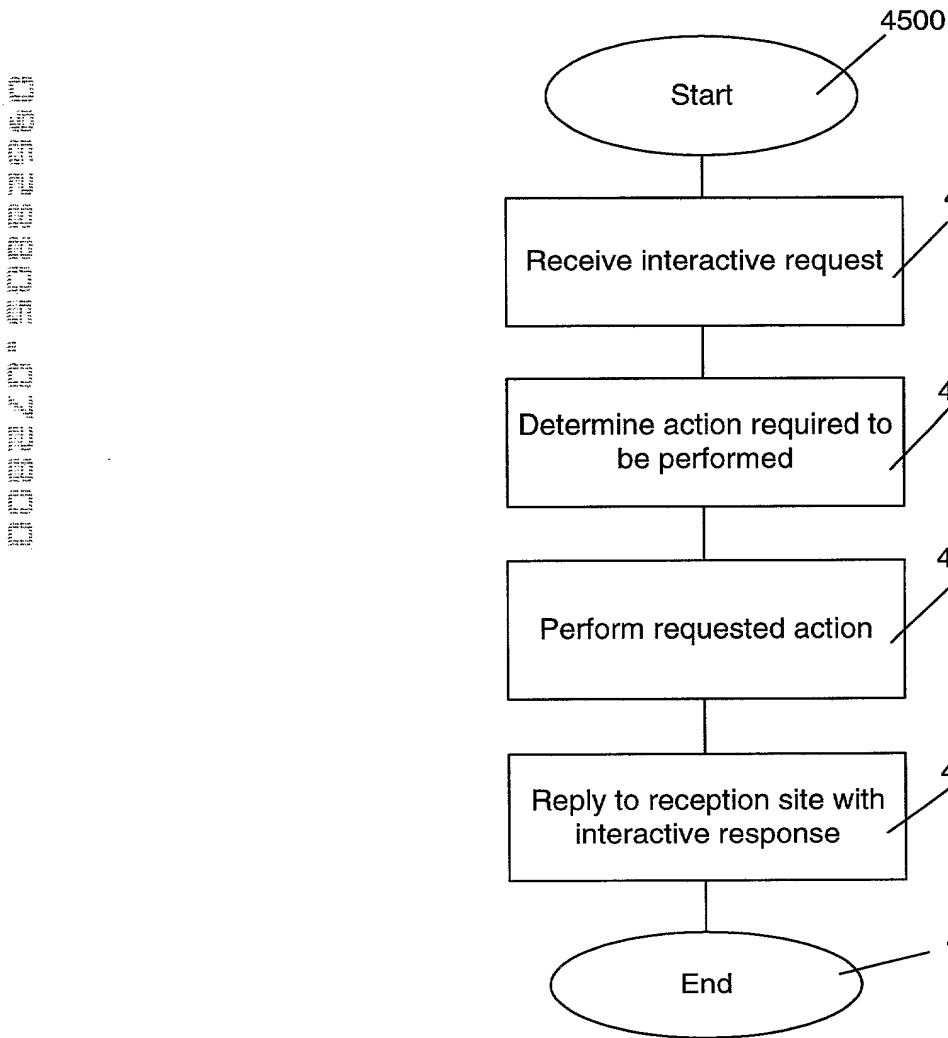


Fig. 28



*Fig. 29*

Docket No.

5220.00

# Declaration and Power of Attorney For Patent Application

## English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

**METHOD AND APPARATUS FOR LOCALLY TARGETING VIRTUAL OBJECTS WITHIN A TERMINAL**

the specification of which

(check one)

☒ is attached hereto.

☐ was filed on \_\_\_\_\_ as United States Application No. or PCT International Application Number \_\_\_\_\_ and was amended on \_\_\_\_\_ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

(Number)

(Country)

(Day/Month/Year Filed)

☐

(Number)

(Country)

(Day/Month/Year Filed)

☐

(Number)

(Country)

(Day/Month/Year Filed)

☐

✓ I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

**09/597,893**

**June 19, 2000**

**Pending**

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

\_\_\_\_\_  
(Status)  
(patented, pending, abandoned)

**09/054,419**

**April 3, 1998**

**Pending**

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

\_\_\_\_\_  
(Status)  
(patented, pending, abandoned)

**08/735,549**

**October 23, 1996**

**Pending**

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

\_\_\_\_\_  
(Status)  
(patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

_____ (Application Serial No.)	_____ (Filing Date)
_____ (Application Serial No.)	_____ (Filing Date)
_____ (Application Serial No.)	_____ (Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

<b>08/160,280</b> _____ (Application Serial No.)	<b>December 2, 1993</b> _____ (Filing Date)	<b>Issued</b> _____ (Status) (patented, pending, abandoned)
<b>07/991,074</b> _____ (Application Serial No.)	<b>December 9, 1992</b> _____ (Filing Date)	<b>Pending</b> _____ (Status) (patented, pending, abandoned)
_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status) (patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

Aldo Noto, Reg. No. 35,628

W. Robinson H. Clark, Reg. No. 41,530

John K. Harrop, Reg. No. 41,817

Christopher McWhinney, Reg. No. 42,875

Matthew Phillips, Reg. No. 43,403

Ami P. Shah, Reg. No. 41,143

Lance L. Vietzke, Reg. No. 36,708

Sean S. Wooden, Reg. No. 43,997

All Of The Law Firm Of:

DORSEY & WHITNEY LLP

1001 Pennsylvania Avenue, N.W.

Suite 300 South

Washington, D.C. 20004

(202) 824-8800

Send Correspondence to: John K. Harrop, Reg. No. 41,817  
DORSEY & WHITNEY LLP  
1001 Pennsylvania Avenue, N.W., Suite 300 South  
Washington, D.C. 20004

Direct Telephone Calls to: *(name and telephone number)*  
John K. Harrop (202) 824-8821

Full name of sole or first inventor

ASMUSSEN, Michael L.

Sole or first inventor's signature

Date

Residence

Fairfax County, Virginia, USA

Citizenship

United States

Post Office Address

2627 Meadow Hall Drive

Oak Hill, Virginia 20171

Full name of second inventor, if any

Second inventor's signature

Date

Residence

Citizenship

Post Office Address